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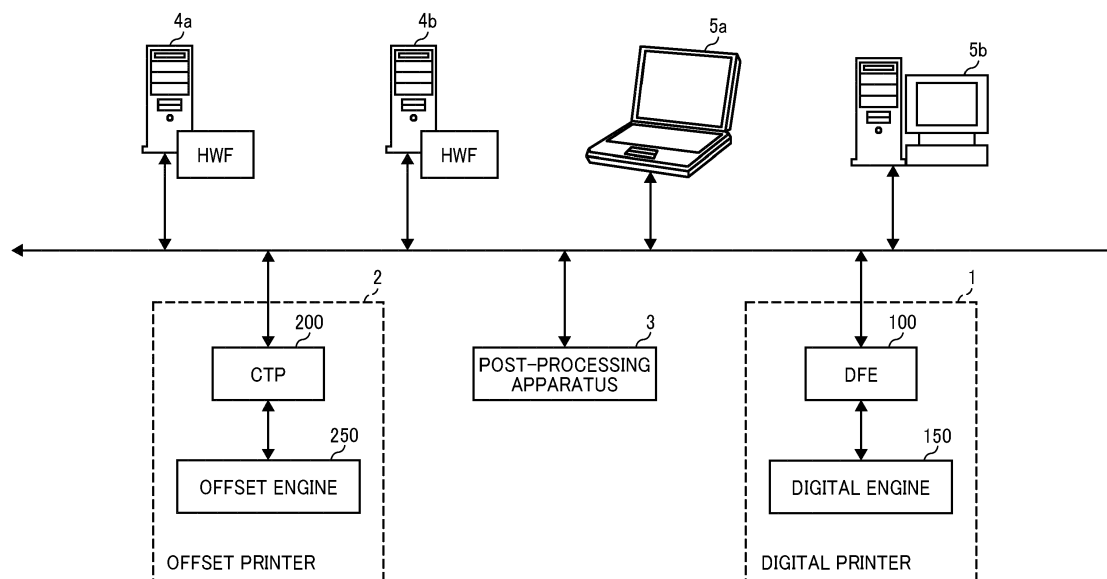
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(54) **IMAGE GENERATION-OUTPUT CONTROL APPARATUS, IMAGE PROCESSING SYSTEM, IMAGE PROCESSING METHOD, AND CARRIER MEDIUM**

(57) An image generation-output control apparatus (100) provided in an image forming apparatus (1) communicable with a server (4) that controls a plurality of processes in an image processing system includes a first image processing unit (120), a second image processing unit (121), a job receiver (111) to update an initial command information received from the server (4) to a specific command information, a part of the initial command information updated to the specific command information processable at the second image processing unit (121)

and not processable at the first image processing unit (120), and a job controller (116) to cause the first image processing unit (120) to generate first image drawing information based on output target image information received from the server (4) and the initial command information that is not updated, and further cause the second image processing unit (121) to generate second image drawing information based on the specific command information and the output target image information received from the server (4).

FIG. 1



Description

BACKGROUND

Technical Field

[0001] This disclosure relates to an image generation-output control apparatus, an image processing system, an image processing method, and a carrier medium of image processing program.

Background Art

[0002] Systems that can define and control various processes for generating a printed product by using a data format such as job definition format (JDF) are known. This system can collectively control various types of printers such as offset printers and digital printers. This system is referred to as a hybrid work flow (HWF) system, and a server that controls the HWF system is referred to as a HWF server.

[0003] The HWF system collectively controls printing processes using various printing apparatuses (e.g., offset printer and digital printer) and a workflow software based on JDF information even if such various printing apparatuses and workflow software are provided by different vendors. Some vendors providing various printing apparatuses and workflow software may extend the JDF information to be used by the HDF system.

[0004] In the HWF system, the offset printer and the digital printer independently perform printing operation based on print data defined by the extended JDF information. However, the digital printer may not be able to interpret the extended JDF information set at the HWF server.

[0005] JP-2013-88992-A discloses an image forming apparatus that can perform a printing operation by using any type of the JDF information. In JP-2013-88992-A, the image forming apparatus acquires JDF analysis data, which is information to interpret the JDF information of software used for the HWF server, from the HWF server to analyze a print job, and performs the printing operation based on an analysis result.

[0006] When the HWF system includes the offset printer and the digital printer, the HWF server performs raster data generation by using a raster image processor (RIP) engine (hereinafter, "RIP processing"), and then the HWF server transfers the raster data to a computer-to-plate (CTP) of the offset printer that generates a plate for the offset printer to perform the printing operation at the offset printer. Further, the HWF server transfers the print data to a digital front end (DFE) of the digital printer, and the DFE performs the RIP processing to cause a printer engine to perform the printing operation at the digital printer.

[0007] When the technique described in JP-2013-88992-A is applied to the HWF system including the offset printer and the digital printer, the RIP engine

of the DFE may interpret the JDF information of the print job differently compared to the RIP engine of the HWF server, in which the RIP engine of the DFE may not perform the RIP processing as intended by an operator. If the HWF server extends the JDF information of the print job so that the RIP engine of the DFE can interpret the JDF information correctly, the JDF information becomes too complex, causing a complex format-adjustment processing in the printing system.

SUMMARY

[0008] As one aspect of the present invention, an image generation-output control apparatus provided in an image forming apparatus communicable with a server that controls a plurality of processes in an image processing system is devised. The image generation-output control apparatus includes a first image processing unit, a second image processing unit, a job receiver to update an initial command information received from the server to a specific command information, a part of the initial command information updated to the specific command information processable at the second image processing unit and not processable at the first image processing unit, and a job controller to cause the first image processing unit to generate first image drawing information based on output target image information received from the server and the initial command information that is not updated, and further cause the second image processing unit to generate second image drawing information based on the specific command information and the output target image information received from the server.

[0009] As another aspect of the present invention, an image processing system to sequentially perform a plurality of processes is devised. The image processing system includes a server to control the plurality of processes in the image processing system, and an image forming apparatus, communicable with the server, including an image generation-output control apparatus to control the image forming operation based on an initial command information received from the server, the initial command information to be used for an image forming operation. The server includes first circuitry to generate initial image drawing information based on output target image information to be output by an image forming operation, the initial image drawing information to be referred in the image generation-output control apparatus when performing the image forming operation. The image generation-output control apparatus of the image forming apparatus includes second circuitry including a first image processing unit to generate first image drawing information, and a second image processing unit to generate second image drawing information. When the second circuitry acquires the initial command information from the server, the second circuitry updates the initial command information to specific command information, in which a part of the initial command information updated to the specific command information processable at the second image

processing unit and not processable at the first image processing unit. The first image processing unit generates the first image drawing information based on the output target image information received from the server and the initial command information received from the server that is not updated, and the second image processing unit generates the second image drawing information based on the specific command information and the output target image information received from the server.

[0010] As another aspect of the present invention, a method of controlling an image generation-output control apparatus of an image forming apparatus communicable with a server disposed in an image processing system is devised. The method includes receiving initial command information and initial drawing information from the server, the initial drawing information being generated at the server based on output target image information to be referred to by the image generation-output control apparatus in performing image forming using the image forming apparatus, updating a part of the initial command information to specific command information in a format not processable by a first image processing unit and processable by a second image processing unit disposed in the image generation-output control apparatus, generating second image drawing information by using the second image processing unit based on the specific command information and the output target image information received from the server, and generating first image drawing information by using the first image processing unit based on the initial command information received from the server that is not updated, and the output target image information received from the server.

[0011] As to the above described example embodiment of the present invention, the printing system can be totally managed, and various types of print jobs can be processed efficiently and effectively without causing the complex format-adjustment processing in the printing system.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] A more complete appreciation of the disclosure and many of the attendant advantages and features thereof can be readily obtained and understood from the following detailed description with reference to the accompanying drawings, wherein:

FIG. 1 is a schematic diagram illustrating a configuration of a system of an example embodiment of the present invention;

FIG. 2 is a schematic diagram illustrating a hardware configuration of an information processing apparatus of an example embodiment of the present invention;

FIG. 3 is an example of JDF information of an example embodiment of the present invention;

FIG. 4 is a schematic diagram illustrating a functional

configuration of a HWF server of an example embodiment of the present invention;

FIG. 5 is an example of workflow information of an example embodiment of the present invention;

FIG. 6 is a schematic diagram illustrating a functional configuration of a DFE of an example embodiment of the present invention;

FIG. 7 is an example of a conversion table of an example embodiment of the present invention;

FIG. 8 is an example of RIP parameter of an example embodiment of the present invention;

FIG. 9 is a schematic diagram illustrating a functional configuration of a RIP engine of an example embodiment of the present invention;

FIG. 10 is another functional configuration of a RIP engine of an example embodiment of the present invention;

FIG. 11 is a sequential chart for an operation flow of a HWF system of an example embodiment of the present invention;

FIG. 12 illustrates an example of a dividing pattern of image data;

FIG. 13 is a schematic diagram illustrating processing of JDF information of an example embodiment of the present invention;

FIG. 14 is a schematic diagram illustrating a functional configuration of a job receiver of an example embodiment of the present invention;

FIG. 15 is flow chart showing the steps of processing in DFE of an example embodiment of the present invention; and

FIG. 16 is flow chart showing the steps of the RIP processing of FIG. 15.

[0013] The accompanying drawings are intended to depict exemplary embodiments of the present invention and should not be interpreted to limit the scope thereof. The accompanying drawings are not to be considered as drawn to scale unless explicitly noted, and identical or similar reference numerals designate identical or similar components throughout the several views.

DETAILED DESCRIPTION

[0014] A description is now given of exemplary embodiments of the present invention. It should be noted that although such terms as first, second, etc. may be used herein to describe various elements, components, regions, layers and/or sections, it should be understood that such elements, components, regions, layers and/or sections are not limited thereby because such terms are relative, that is, used only to distinguish one element, component, region, layer or section from another region, layer or section. Thus, for example, a first element, component, region, layer or section discussed below could be termed a second element, component, region, layer or section without departing from the teachings of the present invention.

[0015] In addition, it should be noted that the terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the present invention. Thus, for example, as used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. Moreover, the terms "includes" and/or "including", when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0016] Furthermore, although in describing views illustrated in the drawings, specific terminology is employed for the sake of clarity, the present disclosure is not limited to the specific terminology so selected and it is to be understood that each specific element includes all technical equivalents that operate in a similar manner and achieve a similar result. Referring now to the drawings, one or more apparatuses or systems according to an example embodiment are described hereinafter.

[0017] A description is given of an image processing system of an example embodiment of the present invention with reference to the drawings. The image processing system includes, for example, an offset printer, a digital printer, and a server, in which both of the offset printer and the digital printer can be controlled by the same server. Hereinafter, this image processing system is referred to a hybrid work flow (HWF) system. In the HWF system, a raster image processor (RIP) engine disposed in a digital front end (DFE) that controls the digital printer, and a raster image processor (RIP) engine disposed in the HWF server can employ the same type of RIP engine, and the digital printer executes a printing operation in this HWF system under the condition that the same type of RIP engine is disposed at the different apparatuses configuring the HWF system. In this description, the same type of RIP engine may mean two or more RIP engines having substantially the same processing capabilities, and thereby the two or more RIP engines are not required to have the exact same processing capabilities.

[0018] FIG. 1 is a schematic configuration of the HWF system of an example embodiment of the present invention. As illustrated in FIG. 1, the HWF system includes, for example, a digital printer 1, an offset printer 2, a post-processing apparatus 3, HWF servers 4a and 4b (hereinafter, collectively referred to HWF server 4 as required), and client terminals 5a and 5b (hereinafter, collectively referred to client terminal 5 as required) connectable with one to another via a network.

[0019] The digital printer 1 is an example of image forming apparatuses such as printers that can generate and output images using an electrophotography method or an inkjet method without using a plate. The digital printer 1 includes, for example, a digital front end (DFE) 100, and a digital engine 150. The DFE 100 can be used as a controller for controlling an image generation and out-

put, which means the DFE 100 can be used as an image generation-output control apparatus, in which the DFE 100 controls the digital engine 150 to perform a print output operation or printing operation. Further, the digital engine 150 can be used as a device for generating an image, which may be referred to as an image generator. Therefore, the DFE 100 includes a raster image processor (RIP) engine that generates raster data that is referred or used by the digital engine 150 when performing the print output operation. The raster data may be referred to as drawing information or image drawing information in this description.

[0020] The offset printer 2 is an example of image forming apparatuses such as printers that can generate and output images by using a plate. The offset printer 2 includes, for example, a computer-to-plate (CTP) 200, and an offset engine 250. The CTP 200 generates a plate based on raster data. The offset engine 250 can perform an offset printing by using the plate generated by the CTP 200.

[0021] The post-processing apparatus 3 can perform various post-processing such as punch, staple, and bookbinding to printed sheets output from the digital printer 1 and/or the offset printer 2. Further, the post-processing apparatus 3 can perform a sheet folding and sheet cutting when the offset printer 2 outputs sheets processed with the imposition.

[0022] The HWF server 4 is a server installed with an HWF software program that is used to manage an image processing operation such as inputting of job data including target image data of a print output operation, processing of the print output operation, and post-processing. The HWF server 4 manages the above mentioned various processing using information generated by using a job definition format (JDF), which is referred to as "JDF information." The HWF server 4 can be used as a process execution control apparatus or a processing control apparatus.

[0023] The HWF server 4 further includes a raster image processor (RIP) engine in the HWF server 4. When the offset printer 2 performs an offset printing operation (i.e., print output operation), the RIP engine in the HWF server 4 generates raster data, and transmits the generated raster data to the CTP 200. The HWF server 4 generates the raster data as initial image drawing information in this description.

[0024] Further, when the digital printer 1 performs a printing operation (i.e., print output operation), the HWF server 4 transmits data to the DFE 100. Since the DFE 100 has the RIP engine as described above, the digital printer 1 can perform the print output operation even when the HWF server 4 transmits print data that is not processed by the RIP processing in the HWF server 4 to the DFE 100.

[0025] As to the HWF system, the same print data may be used for the print output operation by the digital printer 1 and the print output operation by the offset printer 2. For example, one book can be printed by the print output

operation of the digital printer 1 and the print output operation by the offset printer 2, in which the print output operation by the digital printer 1 and the print output operation by the offset printer 2 are performed independently. In this configuration, if the print output operation result by the digital printer 1 and the print output operation result by the offset printer 2 become different such as different fonts and color values, a user feels oddness on a printed product. Therefore, it is preferable that the print output operation result by the digital printer 1 and the print output operation result by the offset printer 2 become substantially the same one.

[0026] The differences of print output operation results by using different devices or apparatuses may occur due to the RIP processing. Therefore, by using the same RIP engine for data or information processing at the digital printer 1 and data or information processing at the offset printer 2, the differences between the print output operation result by the digital printer 1 and the print output operation result by the offset printer 2 can be reduced or minimized.

[0027] Specifically, the RIP engine disposed in the HWF server 4 is an engine that can process data or information for both of the digital printer 1 and the offset printer 2, and the RIP engine disposed in the HWF server 4 can perform common processes for the digital printer 1 and the offset printer 2. Further, the RIP engine disposed in the DFE 100 and the RIP engine disposed in the HWF server 4 employ the same type of RIP engine.

[0028] With employing this configuration, the HWF server 4 and the DFE 100 are disposed with the same RIP engine having the same processing capability. Therefore, when the print output operation by the digital printer 1 is to be performed, the RIP processing by the HWF server 4 and the RIP processing by the DFE 100 can be selectively combined and performed.

[0029] An operator of the HWF system can operate the HWF server 4 by using the client terminal 5, in which the client terminal 5 can be used as an information processing terminal. The client terminal 5 can be any terminal devices or apparatuses such as a general personal computer (PC), but not limited hereto. The operator operates the client terminal 5 to display a graphic user interface (GUI) used for operating the HWF server 4, in which the GUI can be used to input data and setting the JDF information. The JDF information sets information for processing in the HWF system, and the JDF information may be referred to as process setting information.

[0030] A description is given of a hardware configuration of the DFE 100, the HWF server 4, and the client terminal 5 known as information processing apparatuses with reference to FIG. 2. As illustrated in FIG. 2, the information processing apparatus has a configuration similar to general servers and personal computers (PC). Specifically, the information processing apparatus includes, for example, a central processing unit (CPU) 10, a random access memory (RAM) 20, a read only memory (ROM) 30, a hard disk drive (HDD) 40, and an interface

(I/F) 50 that are connectable or couplable by a bus 80. Further, a liquid crystal display (LCD) 60 and an operation unit 70 are connectable or couplable to the interface I/F 50.

[0031] The CPU 10 is a computing unit such as circuitry or a processor that controls the entire operations of the information processing apparatus. The RAM 20 is a volatile memory, to which information can be read and written with high speed, and the CPU 10 uses the RAM 20 as a working area when processing information or data. The ROM 30 is a non-volatile memory used as a read only memory, in which various programs such as firmware are stored. The HDD 40 is a non-volatile memory, to which information can be read and written. For example, the HDD 40 stores an operating system (OS), various control programs, and application programs.

[0032] The I/F 50 is connected or coupled to the bus 80, various units and networks, and controls the connection or coupling. The LCD 60 is a user interface that a user can check the status of the information processing apparatus visually. The operation unit 70 is a user interface such as a key board and a mouse that a user can input information to the information processing apparatus. Since the HWF server 4 is used as a server, a user interface such as LCD 60 and operation unit 70 can be omitted for the HWF server 4.

[0033] As to the above described hardware configuration of the information processing apparatus, the CPU 10 performs computing by loading programs stored in the ROM 30, the HDD 40, and/or an external memory such as an optical disk on the RAM 20 to configure a software control unit. With a combination of the software control unit and the hardware, functional blocks required for the DFE 100, the HWF server 4, and the client terminal 5 can be devised.

[0034] A description is given of the JDF information with reference to FIG. 3. FIG. 3 is an example of the JDF information. As illustrated in FIG. 3, the JDF information includes, for example, "job information" related to a job execution, "edit information" related to the raster data, and "finishing information" related to the post-processing. Further, the JDF information includes, for example, information of "RIP status," "RIP device designation," and "device designation."

[0035] As illustrated in FIG. 3, the "job information" includes information of, for example, "number of copies," "number of total pages," and "RIP control mode." The "number of copies" is information that designates the number of copies of an output target data to be output as a printed product. The "number of total pages" is information that designates the number of total pages included in one printed product. The "RIP control mode" indicates a control mode of the RIP processing, in which a "page mode" and a "sheet mode" can be designated for the "RIP control mode."

[0036] The "edit information" includes, for example, "orientation information," "print face information," "rotation," "enlarge/reduce," "image position," "layout infor-

mation," "margin information," and "crop mark information." The "orientation information" is information that designates a printing orientation of a sheet such as "portrait (vertical)" and "landscape (horizontal)." The "print face information" is information that designates a to-be-printed face such as "duplex" and "one face."

[0037] The "rotation" is information that designates a rotation angle of an image of an output target data. The "enlarge/reduce" is information that designates a size change ratio of an image of an output target data. As to the "image position," "offset" is information that designates an offset of an image of an output target data, and "position adjustment information" is information that designates a position adjustment value of an image of an output target data.

[0038] The "layout information" includes, for example, "custom imposition arrangement," "number of pages," "page sequence information," and "creep position information." The "custom imposition arrangement" is information that designates an arrangement on a custom face. The "number of pages" is information that designates the number of pages printed in one sheet. For example, when images of two pages are condensed and printed on one face of a single sheet, information of "2 in 1" is designated. The "page sequence information" is information that designates a sequence of pages to be printed. The "creep position information" is information that designates a value related to an adjustment of a creep position.

[0039] The "margin information" is information that designates a value related to a margin such as a fit box and a gutter. The "crop mark information" includes, for example, "center crop mark information" and "corner crop mark information." The "center crop mark information" is information that designates a value related to a center crop mark. The "corner crop mark information" is information that designates a value related to a corner crop mark.

[0040] The "finishing information" includes, for example, "Collate information," "staple/binding information," "punch information," "folding information," "trimming," "output tray information," "input tray information," and "cover sheet information." The "Collate information" is information that designates a page-by-page printing or a document-by-document printing when one document is to be printed with a plurality of numbers of copies.

[0041] The "staple/binding information" is information that designates a process related to staple/binding. The "punch information" is information that designates a process related to punch. The "folding information" is information that designates a process related to folding of sheets. The "trimming" is information that designates a process related to trimming of sheets.

[0042] The "output tray information" is information that designates an output tray. The "input tray information" is information that designates an input tray. The "cover sheet information" is information that designates a process related to a cover sheet.

[0043] The "RIP status" is used as execution status information indicating whether each of internal processes included in the RIP processing is already executed. In an example case of FIG. 3, the internal processes of RIP processing includes items such as "pre-flight," "normalize," "font," "layout," "mark," "CMM," "Trapping," "Calibration," and "Screening," and a processing status is set for each of the internal processes of RIP. In the example case of FIG. 3, the processing status of "NotYet" is set for the "RIP status" to indicate that "a concerned process is not yet processed". When each of the internal processes of RIP is executed, the status is updated to "Done" to indicate that "the concerned process is already processed."

[0044] The "RIP device designation" is information that designates a device to perform each of the internal processes of RIP processing. In the example case of FIG. 3, the "RIP device designation" designates the HWF server 4 or the DFE 100 to perform each of the internal processes of RIP processing. As illustrated in FIG. 3, each one of the internal processes of RIP processing is performed by setting any one of the "HWF server" and "DFE" for each of the internal processes of RIP processing. Further, when the "DFE" is set as the RIP device, information designating one of a plurality of RIP engines installed in the DFE 100 or a module that perform the raster data generation can be designated such as "DFE (engine A)" and DFE (external processing unit).

[0045] The "device designation" is information that designates a device that executes a print job. In the example case of FIG. 3, the "digital printer" is designated to execute the print job. Further, the JDF information can include various information other than information illustrated in FIG. 3, which will be described later in this description.

[0046] The JDF information illustrated in FIG. 3 can be generated by an operator. For example, the operator operates the client terminal 5 to display a GUI of the HWF server 4, and then the operator sets various items of the JDF information by using the GUI. The RIP engine disposed in the HWF server 4 and the RIP engine disposed in the DFE 100 can perform the RIP processing based on the JDF information. Further, the post-processing apparatus 3 can perform the post-processing based on the JDF information.

[0047] Further, when a job is input to the HWF server 4 from an external system and software, the job assigned with JDF information may be input. The processing of this case will be described later in detail.

[0048] A description is given of a functional configuration of the HWF server 4 with reference to FIG. 4. As illustrated in FIG. 4, the HWF server 4 includes, for example, a HWF controller 400, and a network interface (I/F) 401. The network I/F 401 is an interface used for communicating information between the HWF server 4 and other devices or apparatuses available for use via a network.

[0049] The HWF controller 400 manages various

processing such as an acquisition of job data of a print target, a generation of a print job, a management of a workflow, and an allocation of job data to the digital printer 1 and the offset printer 2. A process that job data of a print target is input to the HWF server 4 and acquired by the HWF controller 400 is a process of inputting data to the HWF system. The HWF controller 400 can be implemented by installing a specific software program such as a HWF software program in the information processing apparatus.

[0050] As illustrated in FIG. 4, the HWF controller 400 includes, for example, a system controller 410, a data receiver 411, a user interface (UI) controller 412, a job controller 413, a job data storage 414, a device information communication unit 415, a device information manager 416, a device information storage 417, a workflow controller 418, a workflow information storage 419, a RIP engine 420, and a job communication unit 421. The system controller 410 controls the HWF controller 400 entirely. Therefore, the system controller 410 transmits commands to each of the units in the HWF controller 400 to implement each of the above described functions or capabilities of the HWF controller 400. The data receiver 411 receives to-be-printed job data from other system, or to-be-printed job data input by an operation of an operator.

[0051] The UI controller 412 controls an operation operable by an operator via the client terminal 5. For example, a graphical user interface (GUI) used for operating the HWF server 4 is displayed on the client terminal 5, and the UI controller 412 acquires information of an operation work to the GUI displayed on the client terminal 5 via a network.

[0052] The UI controller 412 reports information of the operation acquired via the network to the system controller 410. The display of GUI on the client terminal 5 can be implemented by executing a software program installed in the client terminal 5, or by supplying information to the client terminal 5 from the UI controller 412 via the network.

[0053] The operator operates the GUI displayed on the client terminal 5 to select job data to be input as a print target. Then, the client terminal 5 transmits the selected job data to the HWF server 4, and then the data receiver 411 acquires the selected job data. The system controller 410 registers the job data acquired by the data receiver 411 to the job data storage 414.

[0054] When the job data is to be transmitted from the client terminal 5 to the HWF server 4, the job data is generated in the client terminal 5 based on document data and/or image data selected at the client terminal 5, and then the job data is transmitted to the HWF server 4. The job data is described, for example, by page description language (PDL) format such as portable document format (PDF) and PostScript.

[0055] Further, the client terminal 5 can transmit data of a print target to the HWF server 4 by using an application specific data format or a general image data format.

In this configuration, the system controller 410 instructs the job controller 413 to generate job data based on the acquired data. The job controller 413 generates the job data based on the data of print target by using the RIP engine 420.

[0056] As described above, the data of print target registered in the job data storage 414 is PDL information. The PDL information can be, for example, primary data generated from the data of print target, or intermediate data, which is processed to the middle of the RIP processing. These information can be used as information of an output target image (i.e., output target image information). For example, the intermediate data can be stored in the job data storage 414 when the job data is processed to the middle of the RIP processing that is already started in the HWF server 4, or when the job data is registered in the HWF server 4 with a condition of the intermediate data. Hereinafter, the "PDL information" indicates primary data that is not yet processed by the RIP processing, and the intermediate data indicates data that is processed to the middle of the RIP processing (i.e., processing-not-completed data) in this description.

[0057] Further, as described above, the JDF information illustrated in FIG. 3 can be set and generated by an operation of an operator to the GUI displayed on the client terminal 5. Further, when a job is input to the HWF server 4 from an external system and software, the JDF information may be assigned to the job. The generated or acquired JDF information can be received by the data receiver 411 with the PDL information as the job data. The system controller 410 correlates the acquired JDF information and PDL information, and registers the JDF information and PDL information to the job data storage 414.

[0058] In this description, attribution information indicating job contents is described by using the JDF information, but not limited hereto. For example, the attribution information indicating job contents can be described by using other format such as print production format (PPF).

[0059] Further, the system controller 410 can divide the received job data as required based on an operation of an operator to a GUI displayed on the client terminal 5. For example, the system controller 410 can divide the received job data into a discrete unit of printing portion such as a unit of "page," and each one of the divided job data can be registered in the job data storage 414 as sub-job data, in which the job data is configured by the plurality of the sub-job data.

[0060] When an output-destination device is selected for each of the sub-job data by an operation of an operator to a GUI displayed on the client terminal 5, the operator's selection result is correlated with the sub-job data, and then stored in the job data storage 414. The output-destination device can be set selectively for each of the sub-job data. For example, the digital printer 1 can be selected for printing sub-job data corresponding to a cover of the received job data, and the offset printer 2 can be selected

for printing sub-job data corresponding to a main contents of the received job data.

[0061] The device information manager 416 acquires information of available devices or apparatuses included in the HWF system such as the digital printer 1, the offset printer 2, the post-processing apparatus 3 or the like, and the device information manager 416 stores information of the available devices or apparatuses in the device information storage 417, and manages the information of the available device or apparatuses. The information of available devices includes, for example, a network address allocated to each device when the device is connected or coupled to the network, and device capability information of each device. The device capability information includes, for example, printing speed, available post-processing capability, and operational condition.

[0062] The device information communication unit 415 can acquire information of the available devices included in the HWF system at regular intervals via the network I/F 401. With this configuration, the device information manager 416 can update information of the available devices stored in the device information storage 417 at regular intervals. Therefore, even if the information of the available devices changes over time, the information stored in the device information storage 417 can be updated and maintained at the latest status.

[0063] The workflow controller 418 determines an execution sequence of a plurality of processes to be executed for the job data registered in the job data storage 414 in the HWF system, and stores information of the execution sequence in the workflow information storage 419. Based on the execution sequence set for each of processes in a workflow in advance, the workflow controller 418 can control the execution sequence, in which when one process completes, the sequence proceeds to the next process.

[0064] The workflow information stored in the workflow information storage 419 specifies the execution sequence of each of processes executable in the HWF system, in which the processes are sequentially arranged based on the designated execution sequence. FIG. 5 is an example of workflow information. Further, parameters, which are used when each of the processes is executed, can be designated as the JDF information as above described. The workflow information storage 419 registers the workflow information in advance based on an operation of an operator to the GUI displayed on the client terminal 5.

[0065] An execution instruction of the job data, registered in the HWF server 4, is reported to the system controller 410 via the UI controller 412 based on an operation of an operator to the GUI displayed on the client terminal 5. With this configuration, the system controller 410 can select the above described output-destination device.

[0066] When the output-destination device is selected by using the GUI displayed on the client terminal 5 as described above, the system controller 410 selects the output-destination device based on a designation of the

output-destination device. Further, the output-destination device can be selected automatically based on a comparison of job contents and a device property.

[0067] When the output-destination device is selected automatically based on the comparison of job contents and the device property, the system controller 410 acquires information of device available for use from the device information manager 416. When the output-destination device is determined as above described, the system controller 410 assigns information indicating the determined output-destination device to the JDF information.

[0068] After determining the output-destination device, the system controller 410 instructs the workflow controller 418 to execute a job. In this process, the workflow information, registered in the workflow information storage 419 in advance based on then operation of the operator, can be used. Further, a new workflow information can be generated and then used based on contents set by the operator.

[0069] After receiving the execution instruction from the system controller 410, the workflow controller 418 instructs the job controller 413 to execute each of the processes based on the designated execution sequence of the designated workflow information or the newly generated workflow information. Therefore, the workflow controller 418 and the job controller 413 can be collectively used as a process execution controller.

[0070] After receiving the execution instruction, the job controller 413 inputs the above described PDL information and JDF information to the RIP engine 420 to execute the RIP processing. The JDF information includes information that indicates which one of the HWF server 4 and the DFE 100 is used for processing each of internal processes of the RIP processing using the RIP engine.

[0071] The job controller 413 refers or checks allocation information of the RIP processing included in the JDF information. If one process designated by the workflow controller 418 is a process to be executed by the HWF server 4, the job controller 413 instructs the RIP engine 420 to execute the designated one process. Based on the instruction from the job controller 413, the RIP engine 420 executes the RIP processing based on parameters designated in the JDF information.

[0072] After executing the RIP processing, the RIP engine 420 updates the RIP status of each of the processes executed by the RIP processing. With this configuration, the status of each of the internal processes of the RIP processing executed by the HWF server 4 is changed from "NotYet" to "Done." The RIP engine 420 can be used as a control-side image drawing information generator or control-side drawing information generator.

[0073] The RIP-executed result data generated by executing the RIP processing is any one of PDL information, intermediate data, and raster data. Any one of the PDL information, intermediate data, or raster data can be generated depending on the internal process of the RIP processing. Specifically, as the sequence proceeds, the

intermediate data is generated from primary data such as PDL information, and the raster data is generated as final data from the intermediate data. The RIP-executed result data is correlated with a being-executed job, and stored in the job data storage 414.

[0074] When each one of the internal processes of RIP processing is completed, the RIP engine 420 reports the completion of each one of the internal processes to the job controller 413, and the job controller 413 reports the completion of each one of the internal processes to the workflow controller 418. With this configuration, the workflow controller 418 starts to control a subsequent or next process based on the workflow information.

[0075] If the job contents received from the workflow controller 418 is a request to the other system, the job controller 413 inputs job data, compatible to the other system, to the job communication unit 421, and instructs the job communication unit 421 to transmit the job data. If the job data is to be transmitted to the offset printer 2, the job data of a print target is converted to the raster data, and then the raster data is transmitted to the offset printer 2 as the job data.

[0076] Further, if the job data is to be transmitted to the digital printer 1, the job controller 413 inputs the job data to the job communication unit 421 while designating a RIP engine having capabilities compatible with the RIP engine 420 from a plurality of the RIP engines included in the DFE 100. With this configuration, the job communication unit 421 transmits the job data to the DFE 100 by designating the RIP engine that is the same type of the RIP engine 420.

[0077] The job communication unit 421 transmits the job data such as a package of PDL information and JDF information or a package of intermediate data and JDF information to the DFE 100. Further, the PDL information or intermediate data can be transmitted to the DFE 100 separately from the JDF information, in which the PDL information or intermediate data can be prepared as external resource data, and the JDF information can include universal resource locators (URL) indicating a storage area of the PDL information or a storage area of intermediate data. In this configuration, the DFE 100 that receives the JDF information can access the storage area specified by the URL to acquire the PDL information or intermediate data.

[0078] A description is given of a functional configuration of the DFE 100 with reference to FIG. 6. When the DFE 100 receives job data from the HWF server 4, the DFE 100 controls the received job, an execution of the RIP processing, and the digital engine 150. The HWF server 4 transmits the job data to the DFE 100 and instructs the DFE 100 to execute a print output operation by using the digital engine 150. Therefore, the DFE 100 can be used as a device to provide digital printing capability to the HWF server 4.

[0079] The job control performable by the DFE 100 is a process of controlling a series of processes such as a reception of job data, an analysis of JDF information, a

generation of raster data, and a print output operation by the digital engine 150. The execution control of the RIP processing is a process of controlling the RIP engine and the external processing unit to execute the RIP processing that generates the raster data based on information generated by the analysis of the JDF information and PDL information.

[0080] The information generatable by analyzing the JDF information means that information used for the RIP processing is extracted from the JDF information (FIG. 3), and is then converted to a data format processable by the DFE 100, which is referred to "job attribute in DFE" in this description. By executing the RIP processing by using the job attribute in DFE and the PDL information, the intermediate data and raster data can be generated.

[0081] In the example embodiment, the RIP engine disposed in the HWF server 4 and the RIP engine disposed in the DFE100 performs various processing, and some processing may not be performed by the RIP engine disposed in the DFE100. The external processing unit 121 generates the raster data for the processing not performed by the RIP engine disposed in the DFE100. Further, as to the internal processes of RIP processing that can be performed at any one of the HWF server 4 and the DFE 100, a RIP engine 120 of the DFE 100 generates the raster data. Therefore, the external processing unit 121 disposed in the DFE 100 can be used as an image processing unit that performs the internal processes of RIP processing performable in the HWF server 4. The RIP engine 120 of the DFE 100 may be referred to as a first image processing unit and the external processing unit 121 may be referred to as a second image processing unit in this description.

[0082] The control of the digital engine 150 is a process of transmitting raster data and at least a part of the above described job attribute in DFE to the digital engine 150, and executing the print output operation by the digital engine 150. These capabilities can be implemented by each of units illustrated in FIG. 6. Each of the units illustrated in FIG. 6 can be implemented by activating the hardware (FIG. 2) by loading programs stored in the ROM 30 on the RAM 20 and executing the loaded programs by using the CPU 10.

[0083] As illustrated in FIG. 6, the DFE 100 includes, for example, a network I/F 101, a DFE controller 110, and a display 102. The DFE controller 110 includes, for example, a job receiver 111 including a plurality of specific job receiving units 112, a system controller 113, a job data storage 114, a UI controller 115, a job controller 116, a JDF analyzer 117, a RIP unit 118, a RIP controller 119, a RIP engine 120, an external processing unit 121, an image storage 122, a printer controller 123, a device information manager 124, and a device information communication unit 125.

[0084] The DFE 100 can include a plurality of RIP engines therein, and each of the plurality of RIP engines is compatible with each of RIP engines of other available devices. Specifically, each of the plurality of RIP engines

of the DFE 100 is compatible with each of the RIP engines of other available devices that may transmit job data to the DFE 100 in the HWF system. Since the HWF servers 4a and 4b include different RIP engines, a plurality of the RIP engines that compatible with the RIP engines of HWF servers 4a and 4b is disposed in the DFE 100.

[0085] The job receiver 111 includes the plurality of specific job receiving units 112. In this configuration, each of the specific job receiving units 112 receives job data from the HWF server 4 via the network I/F 101. Each of the plurality of specific job receiving units 112 overwrites the job data so that a certain process that is not shared by the RIP engine disposed in the server 4 and the RIP engine disposed in the DFE 100 (i.e., only one of the server 4 and DFE 100 performs the certain process) can be performed by the external processing unit 121. In this configuration, the job data can be used as command information, and each of the specific job receiving units 112 can be used as a command information updating unit that updates the command information such as the job data. Specifically, the HWF server 4 transmits the job data to the specific job receiving unit 112 in the DFE 100 as initial command information, and the specific job receiving unit 112 updates the initial command information (i.e., job data) to another command information such as specific command information (i.e., job data). The specific job receiving unit 112 can be used as the command information updating units that updates the initial command information (i.e., job data) to another command information such as specific command information (i.e., job data) in this description.

[0086] As described above, when the job data is transmitted from the HWF server 4 to the DFE 100, the RIP engine corresponding to the job data is designated, and the job data is transmitted to the corresponding RIP engine. Therefore, in the job receiver 111, the specific job receiving unit 112, which performs the overwriting process designated by the JDF information, receives the job data. After receiving the job data, the specific job receiving unit 112 overwrites the job data so that the designated process can be executed at the external processing unit 121. The external processing unit 121 of the DFE 100 may be referred to as a second image processing unit in this description.

[0087] In the above described configuration, the job data can be input to the DFE 100 from the HWF server 4 via a network. Further, the job data can be input to the DFE 100 via a portable memory such as a universal serial bus (USB) memory. In this description, the JDF information is included in the job data. If the JDF information is not included in the job data, the job receiver 111 generates dummy JDF information, and assigns the dummy JDF information to the job data.

[0088] The specific job receiving units 112 can be disposed for each of the above described RIP engines. Further, each of the specific job receiving unit 112 can be used as a virtual printer set with job contents in advance. Specifically, each of the specific job receiving units 112

can be disposed for the corresponding RIP engine disposed in the DFE 100 and job contents. Then, by designating any one of the plurality of specific job receiving units 112, the pre-set contents can be overwritten and the external processing unit 121 can execute the job based on the overwritten JDF information. Therefore, the operation of DFE 100 can be controlled by the received job data and the overwritten job data.

[0089] The system controller 113 stores the job data received by the specific job receiving unit 112 in the job data storage 114, or transfers the job data received by the specific job receiving unit 112 to the job controller 116. If the DFE 100 is devised to store the job data, the system controller 113 stores the job data in the job data storage 114. Further, if the JDF information includes a description whether the job data is to be stored in the job data storage 114 or not, the system controller 113 performs the processing in line with the description.

[0090] The job data is stored in the job data storage 114, for example, when a preview of print contents is performed by the DFE 100. In this case, the system controller 113 acquires data of a print target included in the job data, which is PDL information and intermediate data, from the job data storage 114 to generate preview data, and transfers the preview data to the UI controller 115. With this configuration, the UI controller 115 controls the display 102 to display a preview of the print contents on the display 102.

[0091] When the preview data is to be generated, the system controller 113 transfers the data of print target to the job controller 116, and requests the job controller 116 to generate the preview data. The job controller 116 transfers the data of print target to the RIP unit 118 to generate the preview data, and the job controller 116 receives the generated preview data, and transfers the generated preview data to the system controller 113.

[0092] Further, when an operator changes the JDF information for the DFE 100, the job data is stored in the job data storage 114. In this case, the system controller 113 acquires the JDF information from the job data storage 114, and transfers the JDF information to the UI controller 115. With this configuration, the JDF information of the job data is displayed on the display 102, and the operator can change the JDF information by performing an operation on the display 102.

[0093] When the operator changes the JDF information by operating the DFE 100, the UI controller 115 receives the changed information, and reports the changed information to the system controller 113. The system controller 113 applies the received changed information to the target JDF information to update the target JDF information, and stores the updated target JDF information in the job data storage 114.

[0094] When the system controller 113 receives the job execution instruction, the system controller 113 reads out the job data stored in the job data storage 114, and transfers the job data to the job controller 116. The job execution instruction can be input from the HWF server

4 via the network or the job execution instruction can be input by an operation of an operator to the DFE 100. Further, if the JDF information is set with, for example, the execution time, the system controller 113 transfers the job data stored in the job data storage 114 to the job controller 116 when the set execution time has come.

[0095] The job data storage 114 is a memory or a storage area to store the job data, which can be devised, for example, by the HDD 40 illustrated in FIG. 2. Further, the job data can be stored in a memory or a storage area connected to the DFE 100 via a universal serial bus (USB) interface, or can be stored in a memory device connected or coupled via a network.

[0096] As described above, the UI controller 115 controls the display 102 to display information, and receives an operation of an operator to the DFE 100. When the above described editing process is performed to the JDF information, the UI controller 115 interprets the JDF information, and displays contents of the print job on the display 102.

[0097] The job controller 116 controls the job execution when the job execution instruction is transmitted from the system controller 113. Specifically, the job controller 116 controls the JDF analysis process by the JDF analyzer 117, the RIP processing by the RIP unit 118, the control of the digital engine 150 by the printer controller 123, and the raster data generation processing by the external processing unit 121.

[0098] When the job controller 116 receives the job execution instruction from the system controller 113, the job controller 116 inputs the JDF information included in the job data to the JDF analyzer 117 to request a conversion of JDF. The JDF conversion request is a request of converting the JDF information described by a format used by an original or initial generator of the JDF information to a format decodable or processable by the RIP unit 118 or the external processing unit 121. Therefore, the JDF analyzer 117 can be used as a process setting information converter.

[0099] The JDF analyzer 117 converts the JDF information described with the format used by the original generator to the format decodable or processable by the RIP unit 118 or the external processing unit 121. The JDF analyzer 117 retains a conversion table therein, and extracts information required for the RIP unit 118 or the external processing unit 121 from information included in the JDF information, and converts a description format of the extracted information based on the conversion table. With this configuration, the above described job attribute in DFE can be generated.

[0100] FIG. 7 is an example of a conversion table retainable by the JDF analyzer 117. As illustrated in FIG. 7, the conversion table correlates a description format of JDF information and a description format of job attribute in DFE. For example, information of "number of copies" illustrated in FIG. 3 is described as "A-Amount" in the original or initial JDF information, and "A-Amount" is converted to a description of "number of copies" when gen-

erating the job attribute in DFE.

[0101] The job attribute in DFE can be generated based on a process by the JDF analyzer 117 using the conversion table illustrated in FIG. 7. Information described in the job attribute in DFE includes, for example, "job information," "edit information," "finishing information" or the like illustrated in FIG. 3.

[0102] The JDF analyzer 117 sets the "RIP control mode" to the job attribute in DFE when generating the job attribute in DFE. The "RIP control mode" includes the "page mode" and "sheet mode." The JDF analyzer 117 assigns or allocates the "RIP control mode" based on a type of the specific job receiving unit 112 that has received the job data, job contents, and HWF software program installed in the HWF server 4 used as a transmission source of the job data.

[0103] In the configuration described in this specification, condensed printing for a print job can be set by using the "page mode." The "RIP control mode" will be described later in detail.

[0104] Based on the job attribute in DFE generated by the JDF analyzer 117, the job controller 116 generates "RIP parameter," and transfers the "RIP parameter" to the RIP controller 119 in the RIP unit 118 to execute the RIP processing. With this configuration, the RIP unit 118 can execute the RIP processing based on the "RIP parameter."

[0105] FIG. 8 is an example of one set of RIP parameters of an example embodiment. The RIP parameters include, for example, "type of input/output data," "data reading information," and "RIP control mode" as header information. The "type of input/output data" designates the type of input/output data such as JDF, PDL or the like. The designatable format is, for example, JDF, PDL, text format, extension of image data, and intermediate data.

[0106] The "data reading information" includes information of a designation method and a designation position of reading position and writing position of the input/output data. The "RIP control mode" is information that designates the "page mode" and "sheet mode." The header information further includes, for example, information of "unit" used in the RIP parameter, and information of compression method of data.

[0107] The "input/output image information" includes, for example, "information of output image," "information of input image," and "information of image processing." The "information of output image" includes information of, for example, format, resolution, size, color separation, color shift, and page orientation of output image data. The "information of input image" includes information of, for example, format, resolution, page area, and color settings of input image data. The "information of image processing" includes information of, for example, an offset of enlargement/reduction algorithm, an object area, and an offset of halftone.

[0108] The "PDL information" is information related to PDL information used for the RIP parameter. The "PDL

information" includes information of, for example, "data area," "size information," and "data arrangement method." In this description, the PDL information is data of print target in a job, and includes intermediate data. The "data area" designates information of an area where the PDL information is stored. The "size information" designates a data size of the PDL information. The "data arrangement method" designates a data arrangement pattern in a memory storing the PDL information such as "little big endian" and "big endian."

[0109] As illustrated in FIG. 8, the RIP parameter includes the "RIP control mode." The RIP controller 119 controls the RIP engine 120 based on the "RIP control mode." Therefore, the sequence is set based on the "RIP control mode." As above described, the "page mode" and "sheet mode" can be set as the "RIP control mode."

[0110] The "page mode" and "sheet mode" are performed to a plurality of pages to generate the raster data. As to the "page mode," the RIP processing is performed for each page of the plurality of pages, and then the raster data condensing the plurality of RIP-processed pages on one single sheet is generated. As to the "sheet mode," a plurality of pages are condensed on a single sheet at first, and then the RIP processing is performed for each part (i.e., each page) on the single sheet to generate the raster data condensing the plurality of pages on the single sheet.

[0111] Further, the job controller 116 sets "RIP engine identification information" in the RIP parameter. The "RIP engine identification information" is information for identifying each one of the plurality of the RIP engines 120 included in the RIP unit 118, and the external processing unit 121. Therefore, the JDF information includes information for designating the specific job receiving unit 112 as described above, and the designated specific job receiving unit 112 receives the job data. The specific job receiving unit 112 adds the pre-set contents to the received JDF information. Based on the identification information of the RIP engine 120 and the identification information of the external processing unit 121 added to the JDF information, the job controller 116 adds the "RIP engine identification information" to the RIP parameter.

[0112] As above described, the specific job receiving units 112 overwrites the job data, in which any one of the RIP engine 120 and the external processing unit 121 disposed in the DFE 100 is designated and used for generating the raster data. In the example embodiment, the job data overwritten by the specific job receiving units 112 is transmitted to the external processing unit 121 designated by the RIP parameter. Further, the job data duplicated at the specific job receiving unit 112 is transmitted to the RIP engine 120 via the job controller 116. Therefore, the job controller 116 can be used as drawing image information control unit that controls the job for generating the drawing image information.

[0113] As to the RIP unit 118, the RIP controller 119 controls the plurality of RIP engines 120 to perform each of the internal processes of RIP processing based on the

input RIP parameters to generate the raster data. Therefore, the RIP engine 120 can be used as an output-side image drawing information generator or output-side drawing information generator that generates the raster data to be used at the image generator such as the digital engine 150. Further, the external processing unit 121 generates the raster data based on the input RIP parameter. The RIP engine 120 generates the raster data as first image drawing information and the external processing unit 121 generates the raster data as second image drawing information in this description.

[0114] As to the HWF system of the example embodiment, the specific job receiving unit 112 has a process capability to receive a plurality of print jobs from a plurality of different HWF servers 4. Each of the plurality of different HWF servers 4 may process data of print job differently. For example, the above described "page mode" and "sheet mode" of the "RIP control mode" may be differently set for each of the different HWF servers 4. When the external processing unit 121 is set with the "page mode," and the condensed printing is to be performed, the original page data corresponding to the condensing numbers are designated sequentially.

[0115] By contrast, when the external processing unit 121 is set for the "sheet mode," all of the original page data before performing the condensing are designated, and then the raster data is generated. Therefore, the method of designating parameters for the external processing unit 121 becomes different. This difference is not limited to the "RIP control mode." For example, differences may occur due to a difference of format and processing of original data such as a difference of processing of the margin of the original data.

[0116] When the external processing unit 121 receives the job data overwritten by the specific job receiving unit 112 from the job controller 116, the external processing unit 121 generates the raster data based on the received job data. As to the HWF system of the example embodiment, if some of the internal processes of RIP processing performable by the RIP engine 420 of the HWF server 4 cannot be performed by the RIP engine 120 of the DFE 100, the external processing unit 121 is consigned to generate the raster data.

[0117] The processing performable by the external processing unit 121 includes, for example, adding date when the raster data generation is performed at the HWF server 4, and adding a watermark such as semi-transparent figure and letter to the raster data. Further, the external processing unit 121 can be configured to perform a complex imposition process that arranges differently-specified pages on the same page. Since the external processing unit 121 may perform various processing as above mentioned, a plurality of external processing units 121, each having different processing capabilities, can be disposed in one DFE 100.

[0118] The image storage 122 is a memory or a storage area to store raster data generated by the RIP engine 120 and the external processing unit 121. The image

storage 122 can be devised, for example, by the HDD 40 illustrated in FIG. 2. Further, the image storage 122 can be a memory or a storage area connected to the DFE 100 via a universal serial bus (USB) interface, or can be a memory device connected or coupled via a network.

[0119] The printer controller 123 is connected or coupled to the digital engine 150. The printer controller 123 reads raster data stored in the image storage 122, and transmits the raster data to the digital engine 150 to execute a print output operation. Further, the printer controller 123 acquires the finishing information included in the job attribute in DFE from the job controller 116 to control a finishing process.

[0120] The printer controller 123 can communicate information with the digital engine 150 to acquire information of the digital engine 150. For example, when CIP4 standard is used, DevCaps standard is defined as the JDF information standard for communicating device property information with a printer. Further, printer information can be collected by using a communication protocol such as simple network management protocol (SNMP) and a database such as management information base (MIB).

[0121] The device information manager 124 manages the device information such as information of the DFE 100 and the digital engine 150. The device information includes, for example, information of the RIP engines 120 included in the RIP unit 118, information of the specific job receiving units 112 in the job receiver 111, and information of the external processing unit 121.

[0122] The device information communication unit 125 communicates the device information with the HWF server 4 via the network I/F 101 using a compatible format such as MIB and job messaging format (JMF). With this configuration, the device information communication unit 415 of the HWF server 4 can acquire the device information from the DFE 100, with which information of the RIP engines 120, information of the specific job receiving units 112, and information of the external processing unit 121 included in the DFE 100 can be set to a GUI settable and displayable on the client terminal 5.

[0123] As to the DFE 100, when the printer controller 123 controls the digital engine 150, and then a print output operation is completed, the system controller 113 recognizes the completion of the print output operation via the job controller 116. Then, the system controller 113 reports the completion of a job to the HWF server 4 via the job receiver 111. With this configuration, the job communication unit 421 of the HWF server 4 receives a report of the completion of the job.

[0124] As to the HWF server 4, the job communication unit 421 transfers the report of the completion of the job to the job controller 413, and then the job controller 413 reports the completion of the job to the workflow controller 418. The transmission of the job data from the HWF server 4 to the DFE 10 is executed by the workflow controller 418 based on a workflow information.

[0125] When the completion of the job by the DFE 100

is recognized, the workflow controller 418 controls a next process based on the workflow information. A process to be performed after performing the print output operation by the DFE 100 is, for example, a post-processing by the post-processing apparatus 3.

[0126] A description is given of a functional configuration of the RIP engine of the example embodiment. FIG. 9 is a functional configuration of the RIP engine 120 having the JDF analyzer 117 used for the JDF analysis process. As above described, the RIP engine 120 can be a software module that executes each of the internal processes of RIP processing to generate raster data based on the RIP parameter illustrated in FIG. 8. The RIP engine 120 can be, for example, an Adobe systems PDF printing engine (APPE) provided by Adobe systems, but not limited hereto.

[0127] As illustrated in FIG. 9, the RIP engine 120 is configured by a control unit 201 and other units. The other units can be employed as extended units, which can be extended by a vendor. The control unit 201 executes the RIP processing by using various capabilities that can be devised as the extended units. Specifically, as illustrated in FIG. 9, the RIP engine 120 includes the control unit 201 and the extended units such as an input unit 202, a RIP parameter analyzer 203, a pre-fright processing unit 204, a normalize processing unit 205, a mark processing unit 206, a font processing unit 207, a color management module (CMM) processing unit 209, a trapping processing unit 210, a calibration processing unit 211, a screening processing unit 212, an output unit 213 and a rendering processing unit 218.

[0128] The input unit 202 receives an initialization request, and an execution request of the RIP processing, and reports the request to the control unit 201. When the initialization request is received, the above described RIP parameter is also input to the control unit 201. When the control unit 201 receives the initialization request, the control unit 201 inputs the RIP parameter, received at the same time with the initialization request, to the RIP parameter analyzer 203. Then, the control unit 201 acquires an analysis result of the RIP parameter, computed by the RIP parameter analyzer 203, and determines an activation sequence of each of the extended units included in the RIP engine 120 when the RIP processing is performed. Further, the control unit 201 determines a data format generatable by performing the RIP processing, in which the data format can be any one of the raster image, preview image, PDF, and intermediate data.

[0129] Further, when the control unit 201 receives the execution request of the RIP processing from the input unit 202, the control unit 201 activates each of the extended units included in the RIP engine 120 based on the activation sequence that is determined when the control unit 201 receives the initialization request. The pre-fright processing unit 204 checks validity of input PDL data contents. If the pre-fright processing unit 204 detects an illegal PDL attribute, the pre-fright processing unit 204 reports the illegal PDL attribute to the control unit 201.

When the control unit 201 receives this report, the control unit 201 reports the illegal PDL attribute to an external module such as the RIP controller 119 and the job controller 116 via the output unit 213.

[0130] The pre-fright processing checks whether attribute information that disables a processing by other modules included in the RIP engine 120 is included in the received data. For example, the pre-fright processing checks whether a font unable to be processed is designated or not.

[0131] The normalize processing unit 205 converts the input PDL data to PDF if the input PDL data is not PDF but PostScript. The mark processing unit 206 applies graphic information of a designated mark, and superimposes the graphic information at a designated position on an output target print image such as a target print image.

[0132] The font processing unit 207 extracts font data, and embeds the font to PDL data, and outlines the font. The color management module (CMM) processing unit 209 converts a color space of an input image to cyan, magenta, yellow, black (CMYK) based on a color conversion table set by International Color Consortium (ICC) profile. The ICC profile includes color ICC information, and device ICC information.

[0133] The trapping processing unit 210 performs trapping processing. When different color regions are set adjacently via boundaries of the different color regions, a gap may occur at the boundaries when a positional error occurs for the adjacently-set different color regions. The trapping processing expands each of the color regions to fill the gap.

[0134] The calibration processing unit 211 adjusts fluctuation of generated color balance, caused by aging and individual difference of an output device, to enhance precision of color conversion by the CMM processing unit 209. Further, the process by the calibration processing unit 211 can be performed outside the RIP engine 120. Specifically, the calibration processing can be performed at the external processing unit 121, which is outside the RIP engine 120.

[0135] The screening processing unit 212 generates halftone dots in view of a final output such as printed sheet. Further, the process by the screening processing unit 212 can be performed outside the RIP engine 120 similar to the calibration processing unit 211, in which the screening processing is performed at the external processing unit 121. The output unit 213 transmits a RIP processing result to the outside of the RIP engine 120. The RIP processing result is any one of raster image, preview image, PDF, and intermediate data that are determined when the initialization is performed.

[0136] The rendering processing unit 218 performs a rendering processing to generate the raster data based on the input data. Further, as to the configuration of FIG. 9, the processing of the mark processing unit 206, and the processing of the font processing unit 207 can be collectively executed by the rendering processing unit

218.

[0137] A description is given of another functional configuration of the RIP engine 120 with reference to FIG. 10. FIG. 10 is another functional configuration of the RIP engine 120 without using the JDF analysis process by the JDF analyzer 117. As above described, a case that the JDF analyzer 117 does not perform the JDF analysis process means that the internal processes of RIP processing are performed by the HWF server 4 and the DFE 100 as the distributed processing. Therefore, the HWF server 4 includes the RIP engine 420 having the same configuration of the RIP engine 120 illustrated in FIG. 10.

[0138] As illustrated in FIG. 10, most of the functional configuration of the RIP engine 120 not using JDF analysis process by the JDF analyzer 117 are same as the functional configuration of the RIP engine 120 of FIG. 9. Hereinafter, portions different from the configuration of FIG. 9 are described. Similar to FIG. 9, the units other than the control unit 201 can be used as the extended units. Specifically, as illustrated in FIG. 10, the RIP engine 120 includes the control unit 201 and the extended units such as the input unit 202, the pre-fright processing unit 204, the normalize processing unit 205, the mark processing unit 206, the font processing unit 207, the color management module (CMM) processing unit 209, the trapping processing unit 210, the calibration processing unit 211, the screening processing unit 212, the output unit 213, a job attribute analyzer 214, a RIP status analyzer 215, a RIP status manager 216, a layout processing unit 217 and the rendering processing unit 218.

[0139] As to the configuration of FIG. 10, when the control unit 201 receives an initialization request from the input unit 202, the control unit 201 acquires the initialization request and the JDF information. Then, the control unit 201 analyzes the JDF information and PDL information by using the job attribute analyzer 214, and the control unit 201 determines a process sequence of the extended units, and a data format to be generated as a process result of each of the extended units same as the configuration of FIG. 9.

[0140] As to the RIP engine 120 disposed in the DFE 100, data format obtained as a process result by the RIP engine 120 often becomes the raster data to be input to the printer controller 123. By contrast, as to the RIP engine 420 disposed in the HWF server 4, data format obtained as a process result by the RIP engine 420 becomes different depending on patterns of the distributed processing by the HWF server 4 and the DFE 100. Therefore, the control unit 201 of the RIP engine 120 determines the data format (e.g., PDL information, intermediate data) of the process result based on an analysis result by the job attribute analyzer 214.

[0141] Further, the control unit 201 analyzes the RIP status information included in the JDF information by using the RIP status analyzer 215 to check whether one or more already-executed internal processes of RIP processing exist. If the already-executed internal process

of the RIP processing unit exists, the corresponding extended unit is excluded from the target processing units of the RIP processing.

[0142] Further, the RIP status analyzer 215 can analyze the RIP status included in the JDF information, and the RIP status analyzer 215 can similarly analyze the RIP status based on PDL information. In a case of analyzing the PDL information, since the attribute information such as parameter is erased for the already-executed internal processes of RIP processing, it can determine which one or more of the internal processes of RIP processing are not yet performed based on the remaining attribute information.

[0143] The layout processing unit 217 performs the imposition process. Under the control of the control unit 201, the RIP status manager 216 changes the RIP status corresponding to each of the internal processes of RIP already performed by each of the extended units to "Done". The output unit 213 transmits a RIP result to the outside of the RIP engine. The RIP result is data having the data format that is determined when the initialization is performed.

[0144] The rendering processing unit 218 of FIG. 10 performs the rendering processing to generate the raster data based on the input data same as the configuration of FIG. 9. Further, as to the configuration of FIG. 10, the processing of the mark processing unit 206, the processing of the font processing unit 207, and further the processing of the layout processing unit 217 can be collectively executed by the rendering processing unit 218.

[0145] Further, as above described, the information of "RIP device designation" included in the JDF information of the job data may indicate "engine A" and "external processing unit 121" when a plurality of RIP engines 120 and the external processing unit 121 disposed in the DFE100 are selectively used. In this case, the information of "RIP device designation" that designates the external processing unit 121 is described in the job data that is overwritten by the specific job receiving unit 112. Further, since the control unit 201 cannot consign the processing to the external processing unit 121, which is an external module for the RIP engine 120, the job controller 116 determines the consignment destination of the processing.

[0146] As described above, the job controller 116 adds the "RIP engine identification information" to the RIP parameter. In this case, the job controller 116 generates different RIP parameters for each of the different internal processes of RIP processing designated with different RIP engines or the external processing unit. In an example case of FIG. 3, the RIP parameter of "engine A" is generated or designated for executing the "font" and "layout," the RIP parameter of "external processing unit" is generated or designated for executing the "mark," and the RIP parameter of "engine B" is generated or designated for the subsequent processes after the "mark" as illustrated in FIG. 3.

[0147] Then, the job controller 116 designates the RIP

engine 120 or the external processing unit 121, and transmits the job data to the designated RIP engine 120 or external processing unit 121. As to the duplicated job data, each of the RIP engines 120 can perform only the designated process by referring the "RIP status" information. Specifically, by setting the status of to-be-processed items as "NotYet" and the status of other items as "Done," only the designated process can be performed.

[0148] Further, as to the above described HWF system according to an example embodiment, the RIP engine 420 disposed in the HWF server 4 and the RIP engine 120 disposed in the DFE100 employ the same RIP engine. In this description, the same RIP engine means that the RIP engine has the same configuration at least for generating raster data. Therefore, the RIP engine 420 and the RIP engine 120 may not employ the same configuration for every one of the processing units illustrated in FIGs. 9 and 10.

[0149] A description is given of an operation of the HWF system of the example embodiment with reference to FIG. 11. FIG. 11 is a sequential chart of an operation flow of the HWF system. FIG. 11 is an example of a sequential chart when the digital printer 1 executes a print output operation. As illustrated in FIG. 11, the device information communication unit 415 of the HWF server 4 acquires device information from the DFE 100 and the CTP 200 via a network, and the device information manager 416 registers the device information in the device information storage 417 (S1101). The process of S1101 can be performed at regular intervals.

[0150] When a registration of job data is performed by an operation of an operator to a GUI of the HWF system, the client terminal 5 transmits a job registration request to the HWF server 4 (S1102), in which the UI controller 412 of the HWF server 4 acquires the job registration request. With this configuration, the data receiver 411 acquires job data under the control of the system controller 410 (S1103).

[0151] When the data receiver 411 acquires the job data, the system controller 410 controls the job controller 413 to convert a format of the acquired job data to PDL format (S1104), and the format-converted job data is registered in the job data storage 414. As to the GUI that the registration of job data is performed at S1102, an interface such as a file path for designating a registration target data, and an input section for designating each of information items in the JDF information (FIG. 3) can be displayed.

[0152] Further, at S1101, the HWF server 4 acquires the information of the type of RIP engines disposed in the DFE100. Therefore, when the client terminal 5 displays a GUI having an input section used for designating the information of "RIP device designation" (see FIG. 3), an operator can select which one of the RIP engines 120 or the external processing unit 121 is used for executing the processing in the DFE 100.

[0153] Further, when a process of dividing the job data is performed in response to an operation of the operator

to the GUI of the HWF system, the client terminal 5 transmits a job dividing request to the HWF server 4 (S1105). When the job dividing request is issued at S1105, the operator designates the job dividing pattern via an output destination setting screen illustrated in FIG. 12. FIG. 12 is an example of information includable in the job dividing request transmitted at S1105. As illustrated in FIG. 12, information indicating a dividing target job and information indicating dividing contents are transmitted as the job dividing request. In this example case, the information indicating dividing contents is specifically correlated with a device to execute a print output operation of each of the dividing contents. In an example case of FIG. 12, one device is correlated for executing a print output operation of some pages, and another device is correlated for executing a print output operation of other pages, in which the devices are correlated with the unit of "page." The information indicated in FIG. 12 can be used as output destination designation information that designates different output destinations for different pages when the output target image includes a plurality of pages such as page data.

[0154] When the HWF server 4 receives the job dividing request, the system controller 410 divides the dividing target job (i.e., job data) page-by-page based on the information indicating the dividing contents (FIG. 15) to generate a plurality of sub-job data configuring the dividing target job (S1106). In this process, the device designated for each of the divided portions can be used as information of "device designation" in the JDF information (FIG. 3). When the job data is divided to generate the plurality of the sub-job data, each of the sub-job data is stored in the job data storage 414 as a discrete job.

[0155] Further, when a process of generating a workflow is performed in response to an operation of the operator to the GUI of the HWF system, the client terminal 5 transmits a workflow generation request to the HWF server 4 (S1107). When the workflow generation request is transmitted, information designating the workflow contents and information identifying one or more jobs to be processed in line with the workflow information (FIG. 5) are transmitted.

[0156] When the HWF server 4 receives the workflow generation request, the system controller 410 inputs the information received with the workflow generation request to the workflow controller 418. With this configuration, the workflow controller 418 generates a new workflow information based on the received information, and stores the new workflow information in the workflow information storage 419, and correlates the new workflow information and the job identified by the workflow generation request (S1108). The workflow and the job can be correlated by adding, for example, an identifier identifying the workflow to the JDF information.

[0157] When a job execution operation is performed on the client terminal 5 such as when the job execution operation is performed in response to an operation of an operator to the GUI on the client terminal 5 after S1108,

the client terminal 5 transmits a job execution request to the HWF server 4 (S1109). Further, steps S1102 to S1109 can be performed as different processes, or steps S1102 to S1109 can be performed as one-time process that performs the job registration request, job dividing request, workflow generation request, and job execution request as one operation.

[0158] When the HWF server 4 receives the job execution request, the system controller 410 acquires the designated job data from the job data storage 414 based on information for identifying the job data received with the job execution request (S1110). Further, the system controller 410 acquires the latest information of the device designated in the acquired job data from the device information manager 416, and sets the acquired latest device information to the job (S1111).

[0159] Then, the system controller 410 transfers the job data to the workflow controller 418 to start an execution of the workflow (S1112). The workflow controller 418 acquires the workflow information correlated to the acquired job data from the workflow information storage 419, and executes the processes in line with the workflow information.

[0160] As to the workflow processing, the processing in the HWF server 4 to be performed by the RIP engine 420 disposed in the HWF server 4 is executed at first (S1113). At S1113, under the control of the workflow controller 418, the job controller 413 controls the RIP engine 420 to execute the processes as described above.

[0161] When the workflow processing proceeds to a stage to transfer the workflow processing to the DFE 100, under the control of the workflow controller 418, the job controller 413 controls the job communication unit 421 to transmit the job data to the DFE 100 (S1114). At S1114, the job controller 413 designates one of the specific job receiving units 112 from the plurality of specific job receiving units 112 based on information designated in the JDF information.

[0162] When the job data is transmitted to the DFE 100, any one of the plurality of specific job receiving units 112 is designated, in which the specific job receiving unit 112 associated to the job data receives the job data in the DFE 100. When the job data is input into the DFE 100, as described above, the raster data is generated at the RIP engine 120 and the external processing unit 121, and the output processing by the digital engine 150 are performed in the DFE 100 (S1115).

[0163] When the DFE 100 completes the designated processes, the job receiver 111 reports the completion notice of the processes to the HWF server 4 (S1116). When the job controller 413 receives the completion notice of the processes from the DFE 100 via the job communication unit 421, the job controller 413 reports the completion notice of the processes to the workflow controller 418. Then, the workflow controller 418 transmits a post processing request to the post-processing apparatus 3 to execute a post-processing designated in the workflow executable after the processing at the DFE 100

(S117).

[0164] At S 1117, under the control of the workflow controller 418, the job controller 413 controls the job communication unit 421 to transmit the post processing request to the post-processing apparatus 3. By performing the above described processing, the operation of the HWF system completes.

[0165] As to the above described HWF system, the print output operation is performed by using image data used as print output target received from the HWF server 4, but not limited hereto. For example, the print output operation can be performed by using image data used as print output target received from an external software and external system as indicated in FIG. 13. FIG. 13 illustrates a case that the job data described by the same JDF format is transmitted to the DFE 100 from different sender apparatuses such as the HWF server 4 and an external terminal 6 installed with an external software. In this case, since the print jobs input from different sender apparatuses may have differences on processing the JDF information in the DFE 100, the raster data matched to the intension of an operator may not be generated.

[0166] Therefore, in the above described HWF system, the job data is transmitted to the specific job receiving unit 112 that can overwrite the received job data so that the raster data matched to the operation by an operator can be generated. In this case, when the specific job receiving unit 112 receives the job data, the specific job receiving unit 112 updates the job data for the mark processing based on the description of "RIP device designation" (see FIG. 3) so that the job controller 116 sets "external processing unit" to the "RIP engine identification information" (see FIG. 8). As above described, the job data is overwritten and updated by the specific job receiving unit 112 with a format that cannot be read by the RIP engine 120.

[0167] Further, as to the processing that can be performed in the HWF server 4 but cannot be performed in the DFE 100, the specific job receiving unit 112 can be configured to overwrite the job data so that the external processing unit 121, which can generate the raster data outside the RIP engine 120, can perform the processing. A description is given of a functional block diagram of the specific job receiving unit 112 with reference to FIG. 14.

[0168] FIG. 14 is a functional block diagram of the job receiver 111. As illustrated in FIG. 14, the job receiver 111 includes specific job receiving units 112a, 112b, and 112n, and a common job receiving unit 112x. At each of the specific job receiving units 112a, 112b, and 112n, the job data is overwritten so that the assigned job can be executed at the external processing unit 121.

[0169] Specifically, a job to be executed at the RIP engine A is input to the specific job receiving unit 112a, and the job data is overwritten by the specific job receiving unit 112a so that capability "a" is performed at the external processing unit 121. Further, a job to be executed at the RIP engine B is input to the specific job receiving unit 112b, and the job data is overwritten by the specific job

receiving unit 112b so that the capability "a" is performed at the external processing unit 121. Further, a job to be executed at the RIP engine A is input to the specific job receiving unit 112n, and the job data is overwritten by the specific job receiving unit 112n so that capability "c" is performed at the external processing unit 121. Further, the job data not processed by the external processing unit 121 is transmitted to the common job receiving unit 112x, and the job data is not overwritten.

[0170] As above described, each of the specific job receiving units 112a, 112b, and 112n overwrites the initial command information (i.e., job data) received from the HWF server 4 to generate specific command information (i.e., job data), and the specific command information can be used to generate the second image drawing information.

[0171] A description is given of the processing in the DFE 100 at S1115 of FIG. 11 with reference to FIG. 15.

[0172] FIG. 15 is a flow chart illustrating the steps of the processing in the DFE 100. As illustrated in FIG. 15, at first, the specific job receiving unit 112, which is designated when the HWF server 4 transmits the job data, received the job data (S1501). When the specific job receiving unit 112 receives the job data, the specific job receiving unit 112 duplicates the received job data (S1502). The specific job receiving unit 112 overwrites and updates the JDF information to apply a specific setting set for the specific job receiving unit 112 to the job data (S1503), in which the specific job receiving unit 112 has the duplicated job data and the overwritten job data.

[0173] Each of the duplicated job data and the overwritten job data are input to the system controller 113. The system controller 113 stores the input job data (duplicated job data and the overwritten job data) in the job data storage 114 based on the settings, and the system controller 113 controls the UI controller 115 to perform a preview process based on an operation by an operator.

[0174] When the job execution timing at the DFE 100 has come such as when an operator operates the apparatus or the set execution time has come, the system controller 113 inputs the job data to the job controller 116. The job controller 116 inputs the job data to the JDF analyzer 117 to generate the job attribute in DFE (S1504).

[0175] Then, the job controller 116 determines whether the job data is overwritten by referring the input job data (S1505). If the result indicates that the job data is not overwritten (S1505: NO), the job controller 116 generates the RIP parameter described with reference to FIG. 8 (S1506). When the job controller 116 generates the RIP parameter, the job controller 116 inputs the required information to the RIP unit 118 to perform the RIP processing. Then, the RIP controller 119 performs the above described RIP parameter conversion (S1507). Then, the RIP controller 119 transmits the designated converted parameter to the RIP engine 120 to perform the RIP processing (S1508), with which the RIP engine 120 generates the raster data.

[0176] By contrast, if the result indicates that the job

data is overwritten (S1505: YES), the job controller 116 generates the RIP parameter described with reference to FIG. 8 based on the overwritten job data (S1509). When the job controller 116 generates the RIP parameter, the job controller 116 inputs the required information to the external processing unit 121 to perform the raster data generation, in which the external processing unit 121 generates the raster data based on the input RIP parameter (S1510), with which the external processing unit 121 generates the raster data.

[0177] Further, at S1506, the RIP parameter is generated for each of the external processing units 121 based on information designating the "external processing unit" (see FIG. 3) as above described. Then, at S1508 and S1510, the processing is performed for each of the generated parameters with an order of the generated parameters to generate the raster data.

[0178] When the raster data is generated, and the job controller 116 acquires the raster data from the RIP unit 118 and the external processing unit 121, the job controller 116 inputs the raster data to the printer controller 123 to perform the print output operation by using the digital engine 150 (S1511). Then, the processing in the DFE 100 (S1115) is completed.

[0179] As to the above described processing, the input devices that can transmit a print job to each one of the plurality of specific job receiving units 112 can be assigned in advance. In this case, the DFE 100 determines the specific job receiving unit 112 to be input with a print job by referring the device information of the HWF server 4, the external terminal 6, or the like.

[0180] A description is given of a detail of the RIP processing at S1508 of FIG. 15 with reference to FIG. 16. As illustrated in FIG. 16, based on the initialization request input to the input unit 202, the control unit 201 performs an initialization process (S1601). In an example case of FIG. 9, at S1601, the RIP parameter analyzer 203 receives and analyzes the RIP parameter, and determines one or more extended units to be used for executing one or more processes among the extended units included in the RIP engine 120, and a process sequence of processing of the extended units as described above. Further, the RIP parameter analyzer 203 determines a data format of data to be generated as a process result when the processing is performed.

[0181] Further, in another example case of FIG. 10, the job attribute analyzer 214 receives and analyzes JDF information and PDL information to determine one or more extended units to be used for executing one or more processes among the extended units included in the RIP engine 120, and a process sequence of processing of the extended units. Further, the job attribute analyzer 214 determines a data format of data to be generated as a process result when the processing is performed. Then, in another example case of FIG. 10, the control unit 201 instructs the RIP status analyzer 215 to execute the status analysis.

[0182] As to the RIP status analysis, the RIP status

analyzer 215 refers or checks the "RIP status" (FIG. 3), and selects one item of the internal processes of RIP processing (S1602). If the status of the selected item is "Done" (S1603: YES), the corresponding extended unit is excluded from the extended units determined as the execution targets at S1601 (S1604). If the status of the selected item is "NotYet" (S1603: NO), the sequence proceeds to S1605.

[0183] The RIP status analyzer 215 repeats steps from S1602 to S1605 until all of the items of the internal processes of RIP processing is processed (S1605: NO). When the RIP status analyzer 215 completes steps from S1602 to S1605 for all of the items of the internal processes of RIP processing (S1605: YES), and the input unit 202 acquires an execution request of the RIP processing (S1606: YES), the control unit 201 controls each of the extended units to execute the RIP processing with a given process sequence (S1607).

[0184] At S1607, the RIP processing is requested to one or more extended units determined at step S1601 and not excluded by the process at step S1604. Further, the RIP processing is requested to perform in line with the process sequence determined at step S1601. When the one or more extended units perform the RIP processing and the raster data is generated, the output unit 213 outputs a process result (S1608). With this processing configuration, the RIP processing by the RIP unit 118 completes.

[0185] As to the above described HWF system, one print job is input to the RIP engine 120 and another print job is input to the external processing unit 121 to generate the raster data. In this case, the print job input to the external processing unit 121 is a print job overwritten by the specific job receiving unit 112 with a format not readable by the RIP engine 120. In other words, the specific job receiving unit 112 overwrites the received data with a format readable by the external processing unit 121.

[0186] Further, the print job input to the RIP engine 120 is a print job before the specific job receiving unit 112 overwrites the received job data. Therefore, even if the input print job described by the same JDF format is transmitted to the DFE 100, various types of print jobs efficiently and effectively can be processed using different systems and different software.

[0187] Further, since a plurality of the HWF servers 4 can be disposed in the HWF system, various different data having different parameter designation formats may be input when the RIP processing is performed, in which the parameter designation format is required to be changed or converted based on each of the input parameter designation formats, and thereby the job controller 116 (FIG. 6) may be configured to implement the format conversion. However, since the job controller 116 is linked to other main modules in the DFE 100 such as the system controller 113 and the printer controller 123, the capability extension of the job controller 116 may affect the whole operation of the HWF system greatly.

[0188] By contrast, as to the above described DFE 100

of the example embodiment, the RIP controller 119 can perform the parameter conversion process under the control of the job controller 116, in which the RIP controller 119 can be used as a control parameter converter. Therefore, the above mentioned problem caused by the capability extension of the job controller 116 can be prevented, and by extending the capability of the RIP controller 119, parameters having various formats can be converted to designated appropriate formats without affecting the whole operation of the HWF system.

[0189] As to the above described an example embodiment, the "page mode" and "sheet mode" can be set as the "RIP control mode." As above described, as to the "page mode," before condensing a plurality of pages on a single sheet, the RIP controller 119 transmits data of each one of the plurality of pages to the RIP engine 120, the RIP processing is performed for each page of the plurality of pages, and then raster data condensing the plurality of pages on the single sheet is generated.

[0190] In another case, the RIP controller 119 can transmit all of data of a plurality of pages before performing the condensing and RIP-processing to the RIP engine 120, and the RIP engine 120 can execute the RIP processing to the data while performing the imposition processing. This processing mode is referred to a "surface mode." Similar to the above case, when the "surface mode" is used, the RIP controller 119 performs the parameter conversion process, and designates parameters such as control parameters to be used for the RIP engine 120 that is used to execute the RIP processing, with which the same or similar effect described in the above example embodiments can be attained.

[0191] Further, as to the above described example embodiment, the external processing unit 121 that performs the raster data generation depending on the format of original data can be selected. In this case, when the external processing unit 121 receives process target data from the job controller 116, the external processing unit 121 generates the raster data depending on the designation of "RIP control mode" such as "page mode," "sheet mode," and "surface mode." By using the capability of the external processing unit 121, difference of the parameter designation method in the original data and "RIP control mode" set for the external processing unit 121 can be coped.

[0192] Further, as to the above described HWF system, the same RIP engine can be disposed at each of the plurality of devices, and each of the devices to execute each of the internal processes of RIP processing can be managed based on information of the "RIP device designation" illustrated in FIG. 3. Therefore, when the RIP processing is executed at the DFE 100, the internal process of RIP processing already executed at the HWF server 4 can be excluded from the RIP processing at the DFE 100 based on information of the "RIP status."

[0193] With employing this configuration, an operator of the HWF system can easily change the internal processes of RIP processing to be processed at each of the

devices by changing the information of the "RIP device designation" and by designating each of the external processing unit 121. Further, as to the RIP processing at the RIP engine 120 disposed in the DFE 100, since the required processes can be determined based on the information of the "RIP status," only the required processes can be executed at the RIP engine 120 disposed in the DFE 100. With employing this configuration, when the raster data is generated at a plurality of devices, the processing at each of the devices can be easily changed.

[0194] As illustrated in the information of "RIP device designation" of FIG. 3, as to the above described HWF system, when the raster data generation is performed in the DFE 100, any one of the RIP engine 120, a plurality of the external processing unit 121a to 121n can be designated in the DFE 100.

[0195] As to the above described HWF system, when the processing performable by the RIP engine 420 in the HWF server 4 is not performable by the RIP engine 120, the external processing unit 121 is used, but not limited hereto. For example, the raster data generation can be performed by using each of the external processing units 121 flexibly, in which the HWF server 4 can designate which raster data generation is assigned and performed at which of the RIP engine 120 and the external processing unit 121 for one print job.

[0196] Further, in another case, the DFE 100 can analyze the contents of the received data, with which the DFE 100 can determine or identify one or more processes of the RIP processing that have been already executed at the HWF server 4. However, in this case, a process to analyze the contents of the received data is required, and thereby the time for analyzing the received data is required. By contrast, if the information of the "RIP status" is used, an image generation-output operation can be executed with lesser time by not performing the analyzing process.

[0197] As to the above described HWF system, the RIP engine 420 disposed in the HWF server 4 and the RIP engine 120 disposed in the DFE 100 use the same engine type to configure the image processing system. However, the RIP engine 420 in the HWF server 4 and the RIP engine 120 disposed in the DFE 100 may not be required to be the same engine type when the DFE 100 has the specific job receiving unit 112 that can overwrite the received print job as above described.

[0198] Therefore, even if the HWF system employs HWF server 4 having the RIP engine 420 and the DFE 100 having the RIP engine 120, which are not the same engine type, the above described DFE 100 having the specific job receiving unit 112 can process various types of print jobs efficiently and effectively without causing a complex format adjusting process in the printing system. Therefore, when a print process management system employs the above described HWF system including the DFE 100 having the specific job receiving unit 112, the print process management system can process various

types of print jobs efficiently and effectively without changing the system greatly.

[0199] As to the above described example embodiment of the present invention, the printing system can be totally managed, and various types of print jobs can be processed efficiently and effectively without causing the complex format-adjustment processing in the printing system.

[0200] Each of the functions of the described embodiments may be implemented by one or more processing circuits or circuitry. Processing circuitry includes a programmed processor, as a processor includes circuitry. A processing circuit also includes devices such as an application specific integrated circuit (ASIC), digital signal processor (DSP), field programmable gate array (FPGA), and conventional circuit components arranged to perform the recited functions. Further, the above described image processing method performable in the image processing apparatus can be described as a computer-executable program, and the computer-executable program can be stored in a ROM or the like in the image processing apparatus and executed by the image processing apparatus. Further, the computer-executable program can be stored in a storage medium or a carrier such as compact disc-read only memory (CD-ROM), digital versatile disc-read only memory (DVD-ROM) or the like for distribution, or can be stored on a storage on a network and downloaded as required.

[0201] Numerous additional modifications and variations for the communication terminal, information processing system, and information processing method, a program to execute the information processing method by a computer, and a storage or carrier medium of the program are possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims, the disclosure of the present invention may be practiced otherwise than as specifically described herein. For example, elements and/or features of different examples and illustrative embodiments may be combined each other and/or substituted for each other within the scope of this disclosure and appended claims.

Claims

1. An image generation-output control apparatus (100) provided in an image forming apparatus (1) communicable with a server (4) that controls a plurality of processes in an image processing system, the image generation-output control apparatus (100) comprising:

a first image processing unit (120);
a second image processing unit (121);
a job receiver (111) to update an initial command information received from the server (4) to a specific command information, a part of the initial command information updated to the specific

command information processable at the second image processing unit (121) and not processable at the first image processing unit (120); and

a job controller (116) to cause the first image processing unit (120) to generate first image drawing information based on output target image information received from the server (4) and the initial command information that is not updated, and further cause the second image processing unit (121) to generate second image drawing information based on the specific command information and the output target image information received from the server (4).

2. The image generation-output control apparatus (100) of claim 1, wherein the job receiver (111) includes a plurality of command information updating units (112a, 112b, 112n), and the plurality of command information updating units (112a, 112b, 112n) update the initial command information to generate the specific command information that are different from each other.
3. The image generation-output control apparatus (100) of claim 1 or claim 2, wherein, in response to receiving information that identifies a sender of the initial command information, the job receiver (111) updates the initial command information to the specific command information based on the information that identifies the sender of the initial command information to generate the second image drawing information.
4. An image processing system to sequentially perform a plurality of processes, comprising:

a server (4) to control the plurality of processes in the image processing system; and
an image forming apparatus (1), communicable with the server (4), including an image generation-output control apparatus (100) to control the image forming operation based on an initial command information received from the server (4), the initial command information to be used for an image forming operation,
wherein the server (4) includes a first processor (10, 420) to generate initial image drawing information based on output target image information to be output by an image forming operation, the initial image drawing information to be referred in the image generation-output control apparatus (100) when performing the image forming operation,
wherein the image generation-output control apparatus (100) of the image forming apparatus (1) includes a second processor (10, 111) including a first image processing unit (120) to

generate first image drawing information, and a second image processing unit (121) to generate second image drawing information;
 wherein when the second processor (10, 111) acquires the initial command information from the server (4), the second processor (10, 111) updates the initial command information to specific command information, in which a part of the initial command information updated to the specific command information processable at the second image processing unit (121) and not processable at the first image processing unit (120),
 wherein the first image processing unit (120) generates the first image drawing information based on the output target image information received from the server (4) and the initial command information received from the server (4) that is not updated, and the second image processing unit (121) generates the second image drawing information based on the specific command information and the output target image information received from the server (4).

cute the method of claim 5.

5. A method of controlling an image generation-output control apparatus (100) of an image forming apparatus (1) communicable with a server (4) disposed in an image processing system, the method comprising:

receiving initial command information and initial drawing information from the server (4), the initial drawing information being generated at the server (4) based on output target image information to be referred to by the image generation-output control apparatus (100) in performing image forming using the image forming apparatus (1);
 updating a part of the initial command information to specific command information in a format not processable by a first image processing unit (120) and processable by a second image processing unit (121) disposed in the image generation-output control apparatus (100);
 generating second image drawing information by using the second image processing unit (121) based on the specific command information and the output target image information received from the server (4); and
 generating first image drawing information by using the first image processing unit (120) based on the initial command information received from the server (4) that is not updated, and the output target image information received from the server (4).

6. A carrier medium storing a program that, when executed by a computer, causes the computer to exe-

FIG. 1

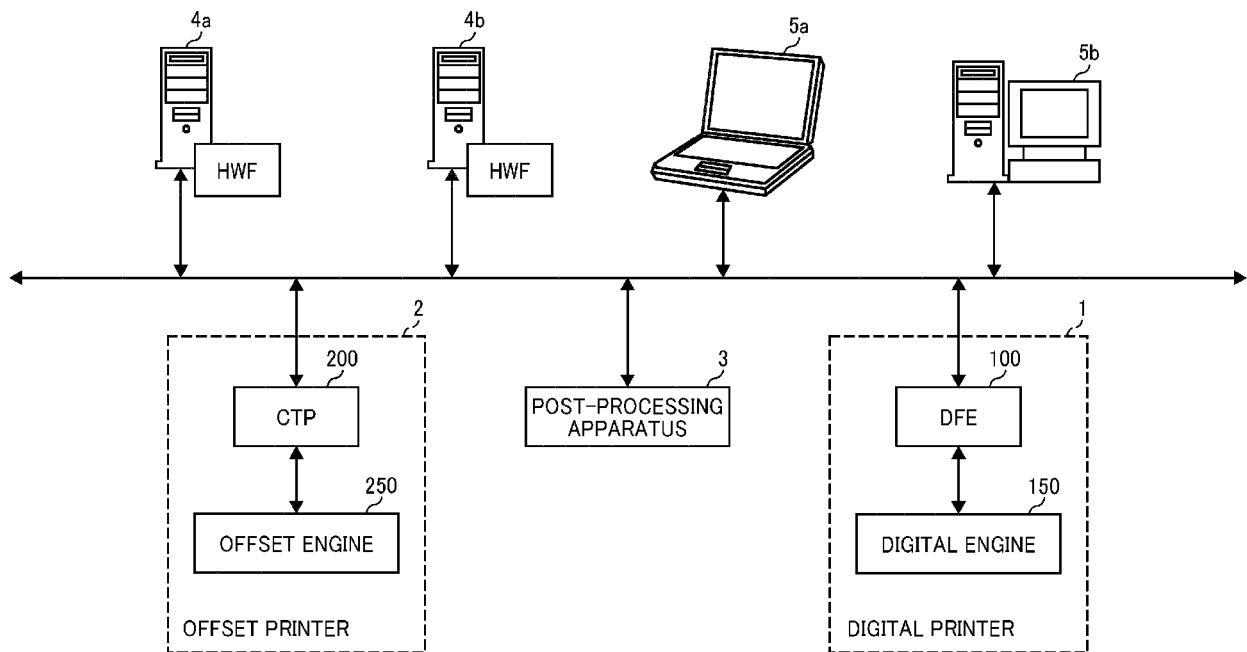


FIG. 2

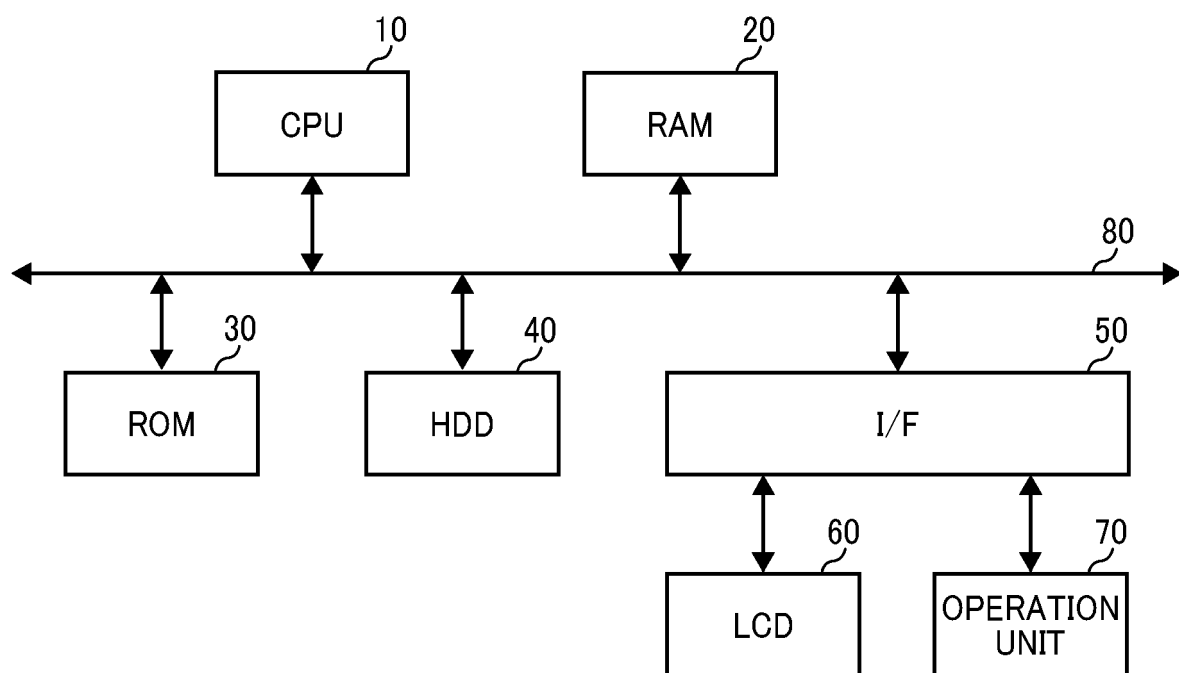


FIG. 3

JDF INFORMATION

JOB INFORMATION

NUMBER OF COPIES : XX COPIES
 NUMBER OF TOTAL PAGES : XX PAGES
 RIP CONTROL MODE : PAGE MODE

RIP STATUS

PRE-FRIGHT : NotYet
 NORMALIZE : NotYet
 FONT : NotYet
 LAYOUT : NotYet
 MARK : NotYet
 CMM : NotYet
 TRAPPING : NotYet
 CALIBRATION : NotYet
 SCREENING : NotYet

EDIT INFORMATION

ORIENTATION INFORMATION : PORTRAIT
 PRINT FACE INFORMATION : DUPLEX
 ROTATION : 90 DEGREES
 ENLARGE/REDUCE : 125%

IMAGE POSITION

OFFSET : XX
 POSITION ADJUSTMENT
 INFORMATION : XX

LAYOUT INFORMATION

CUSTOM-IN-POSITION : XX
 NUMBER OF PAGES : 2 IN 1
 IMPOSITION INFORMATION : LEFT TO
 RIGHT

PAGE SEQUENCE
 INFORMATION : XX

CREEP POSITION
 INFORMATION : XX

MARGIN INFORMATION : XX

CROP MARK INFORMATION

CENTER CROP MARK
 INFORMATION : XX

CORNER CROP MARK : XX

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RIP DEVICE DESIGNATION

PRE-FRIGHT : HWF SERVER
 NORMALIZE : HWF SERVER
 FONT : DFE (ENGINE A)
 LAYOUT : DFE (ENGINE A)
 MARK : DFE (EXTERNAL
 PROCESSING
 UNIT)
 CMM : DFE (ENGINE B)
 TRAPPING : DFE (ENGINE B)
 CALIBRATION : DFE (ENGINE B)
 SCREENING : DFE (ENGINE B)

. . .

DEVICE
 DESIGNATION : DIGITAL PRINTER

FINISHING INFORMATION

COLLATE INFORMATION : PAGE BY PAGE

STAPLE/BINDING
 INFORMATION : STAPLE

PUNCH INFORMATION : XX

FOLDING INFORMATION : XX

TRIMMING : XX

OUTPUT-TRAY INFORMATION : TRAY XX

INPUT-TRAY INFORMATION : TRAY XX

COVER SHEET INFORMATION : XX

. . .

FIG. 4

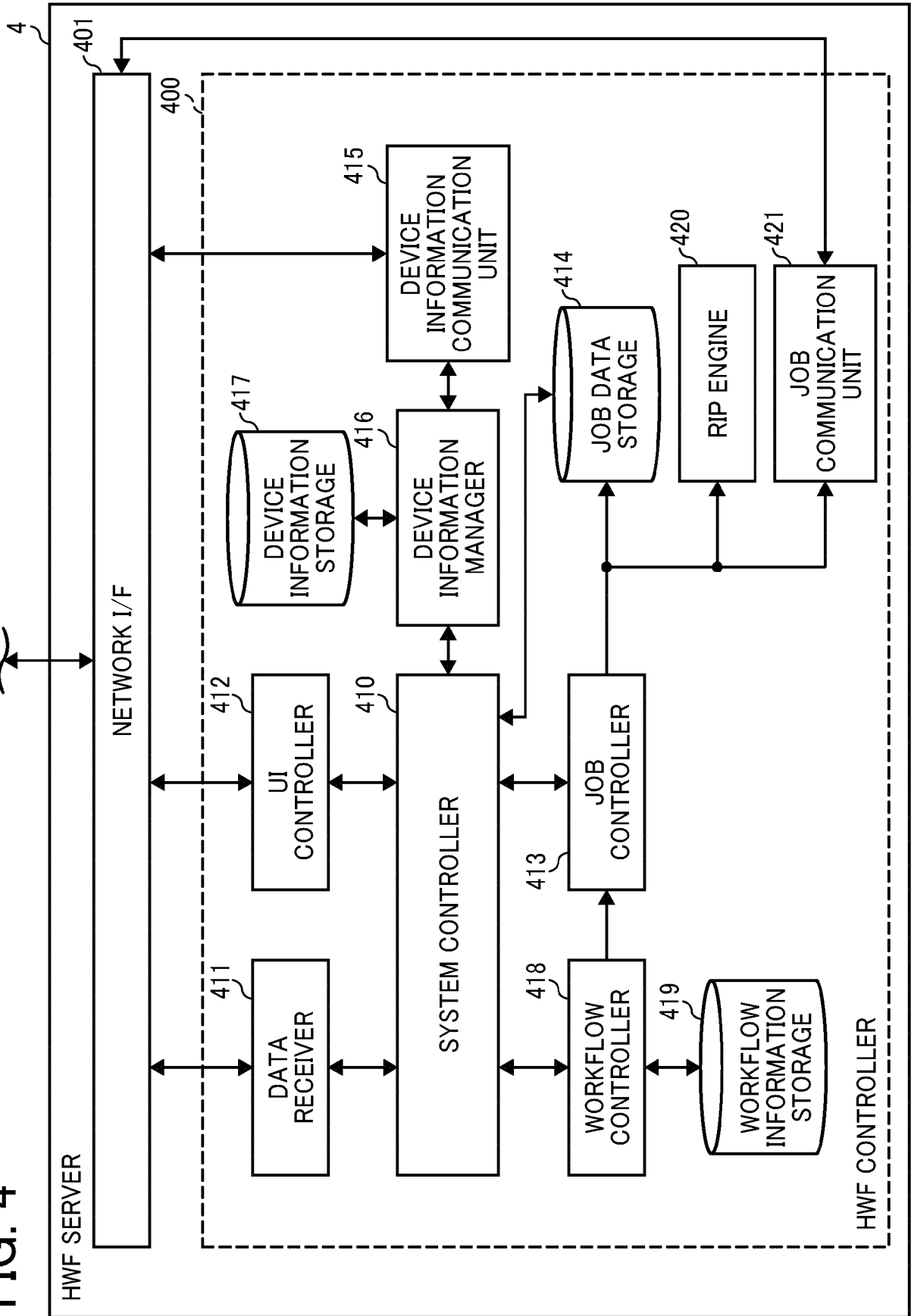


FIG. 5

WORKFLOW INFORMATION

- 1) INPUT OF DATA
- 2) HWF SERVER (RIP)
- 3) PREVIEW
- 4) TRANSMISSION TO DFE
- 5) POST PROCESSING

. . .

FIG. 6

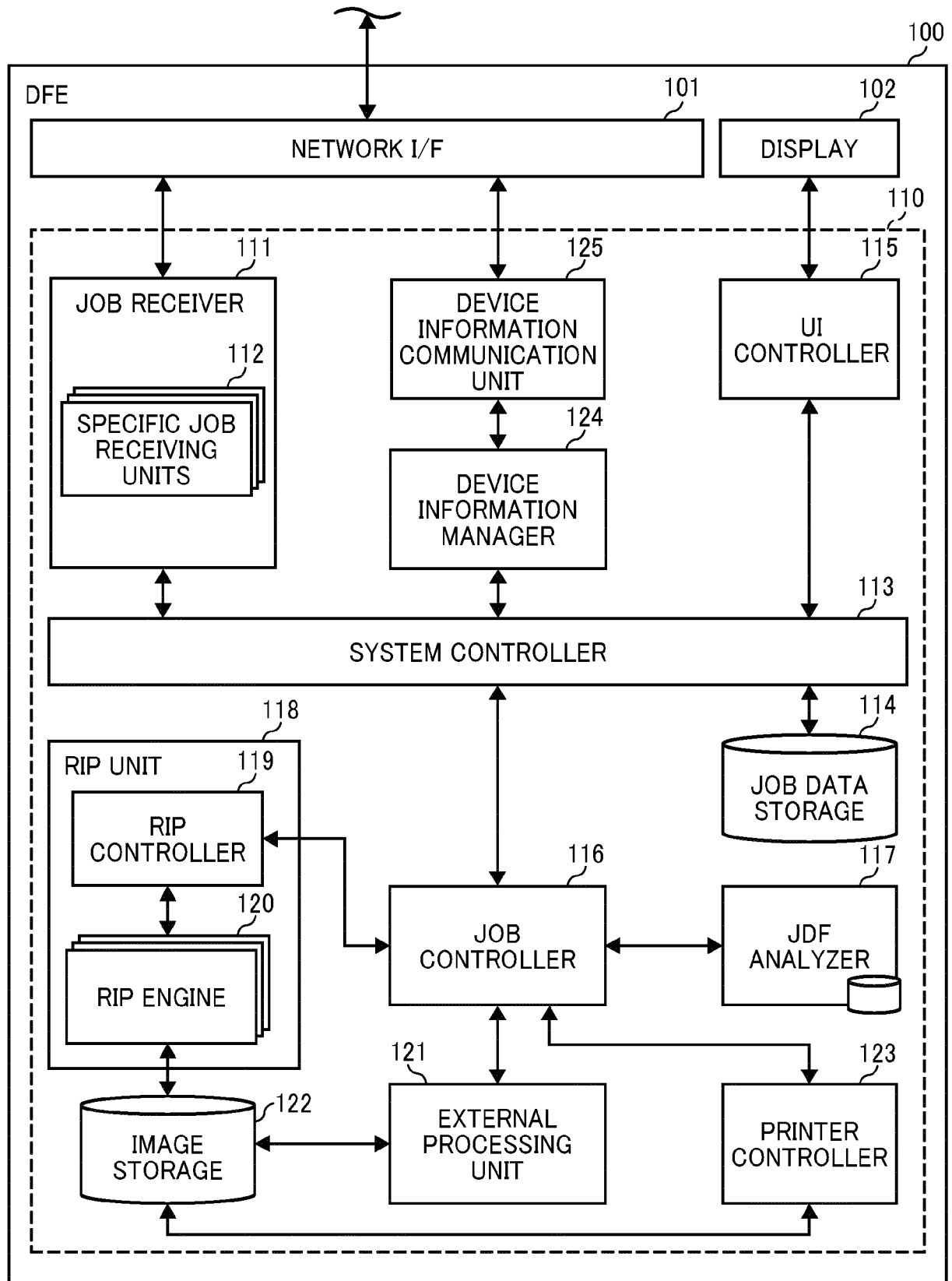


FIG. 7

JDF INFORMATION	JOB ATTRIBUTE IN DFE
A-AMOUNT	NUMBER OF COPIES
A-ROTATE	ROTATION
. . .	

FIG. 8

RIP PARAMETER

TYPE OF INPUT/OUTPUT DATA : JDF, PDL
 DATA READING INFORMATION : XXXX
 RIP CONTROL MODE : PAGE MODE
 . . .

 INPUT/OUTPUT IMAGE INFORMATION
 INFORMATION OF OUTPUT IMAGE

. . .

INFORMATION OF INPUT IMAGE

. . .

INFORMATION OF IMAGE PROCESSING

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PDL INFORMATION

DATA AREA : XXXX
 SIZE INFORMATION : XXXX
 DATA ARRANGEMENT : XXXX

RIP ENGINE IDENTIFICATION INFORMATION : ENGINE A

FIG. 9

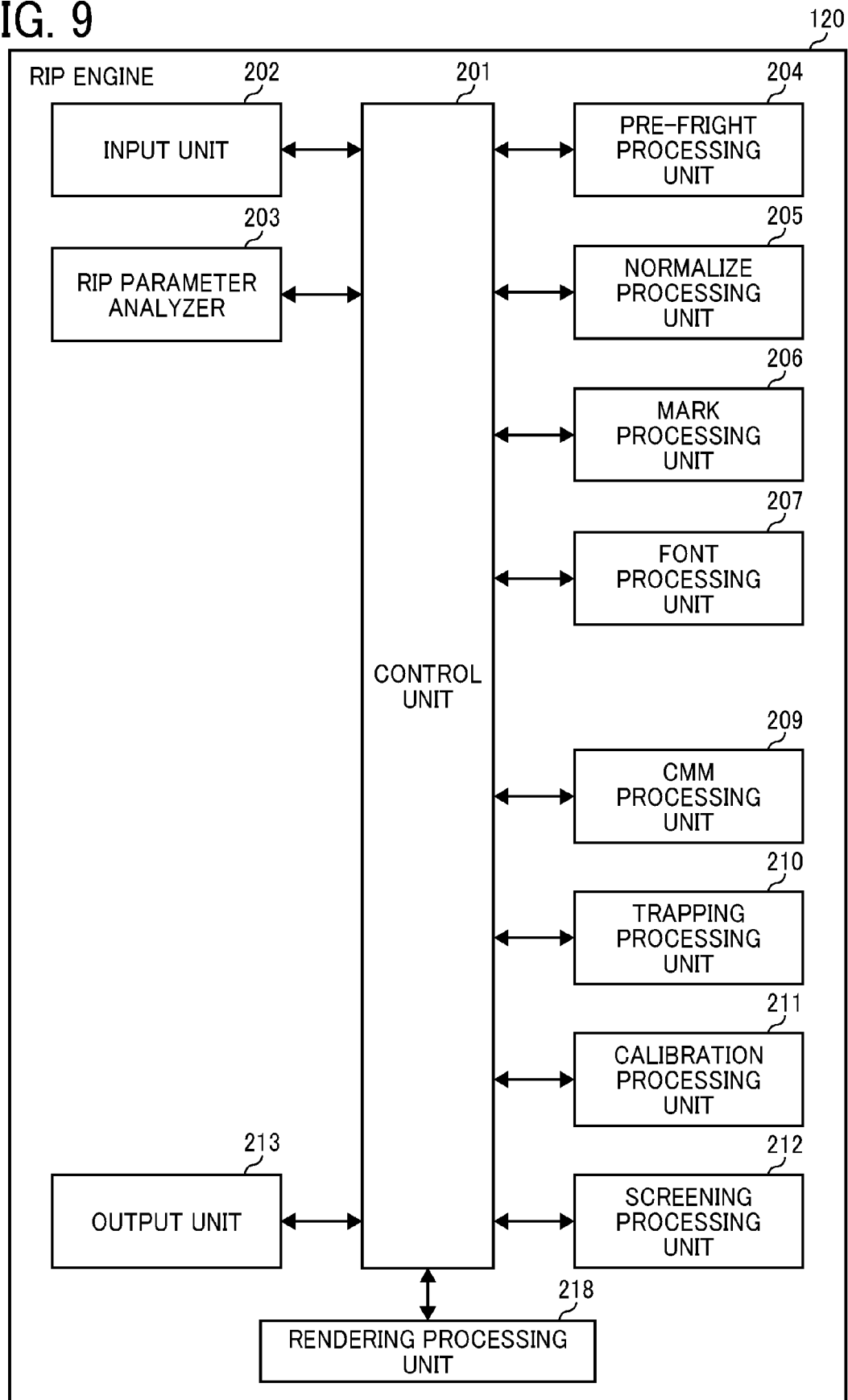


FIG. 10

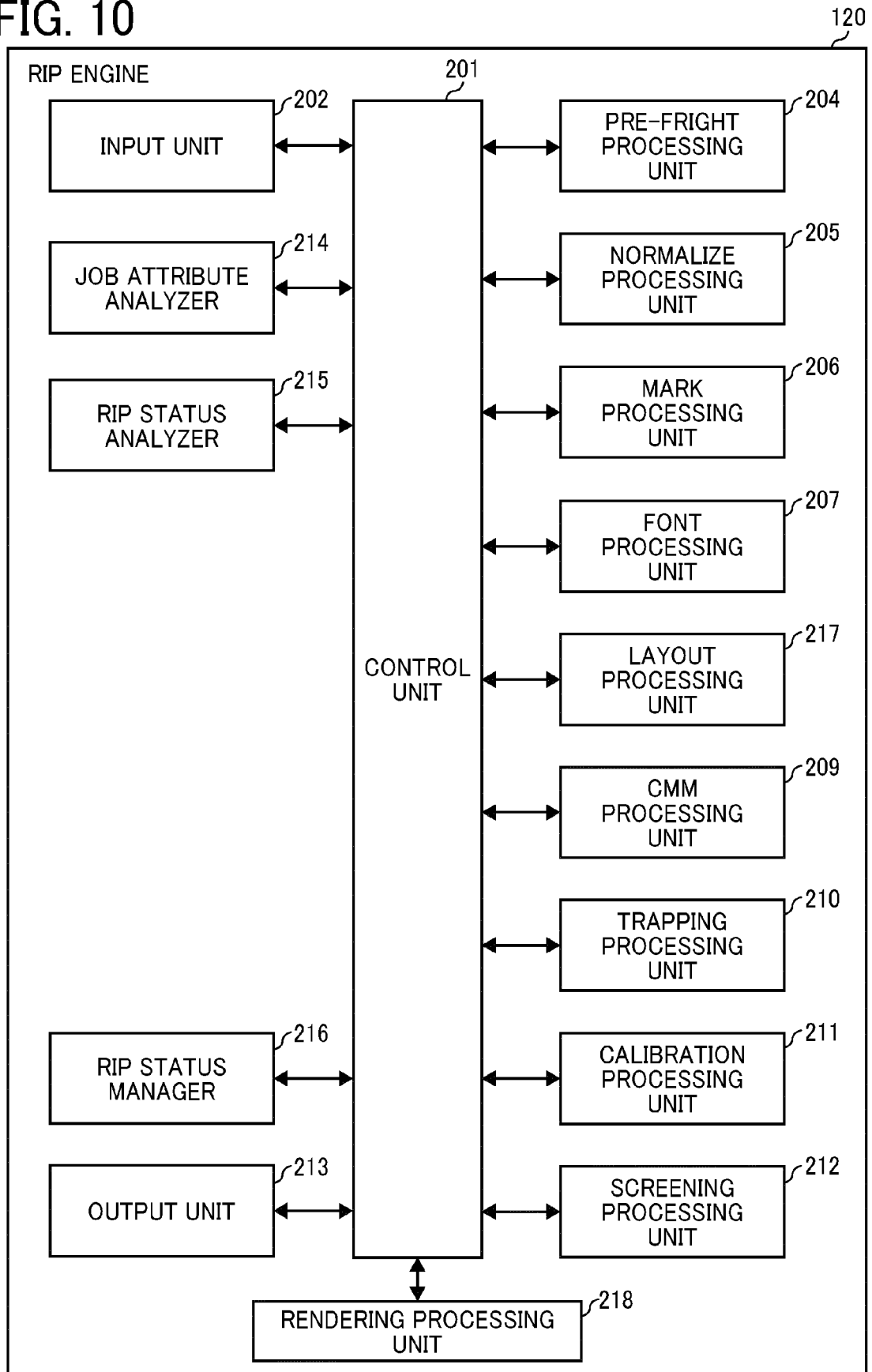


FIG. 11

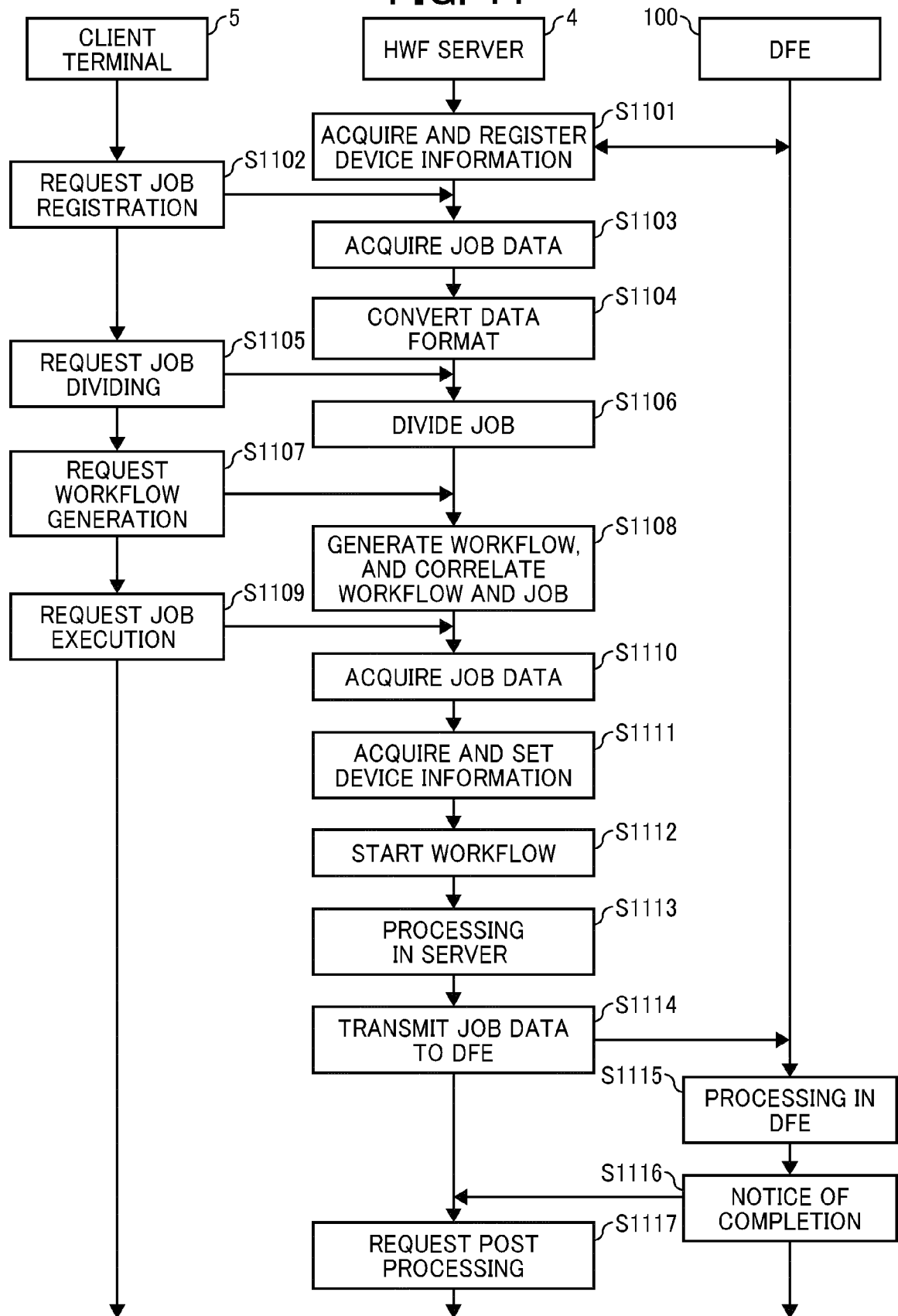


FIG. 12

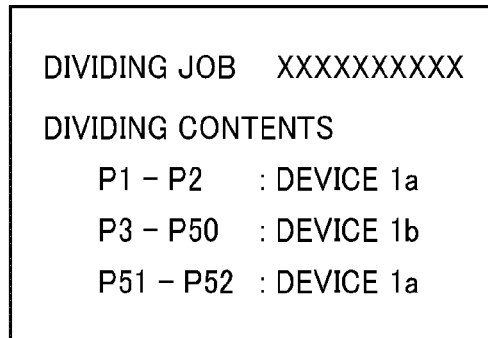


FIG. 13

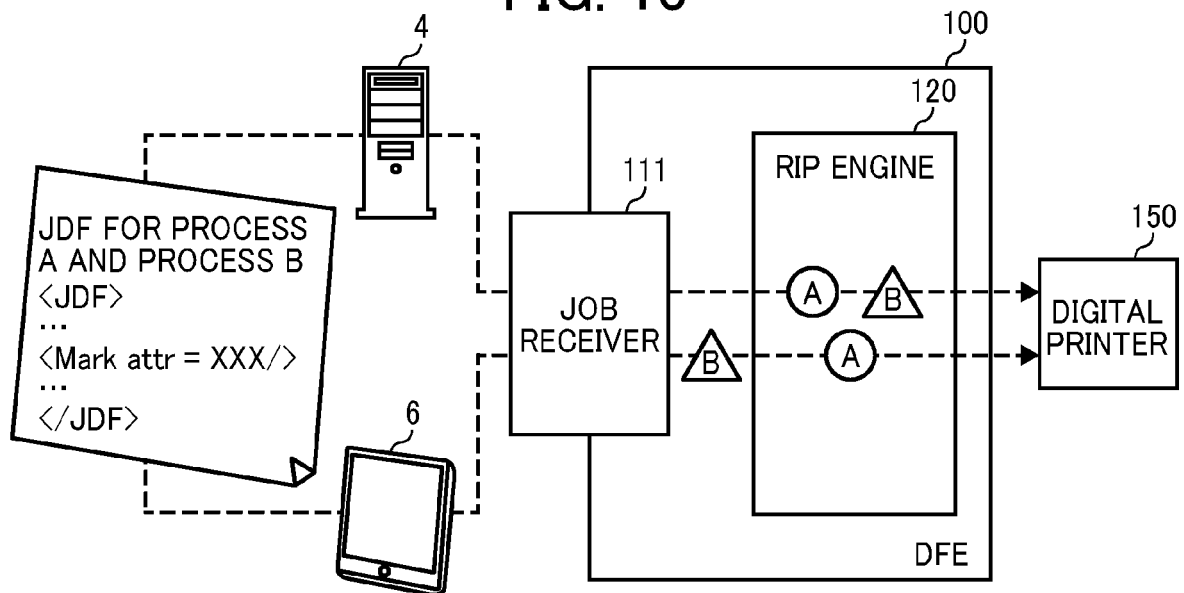


FIG. 14

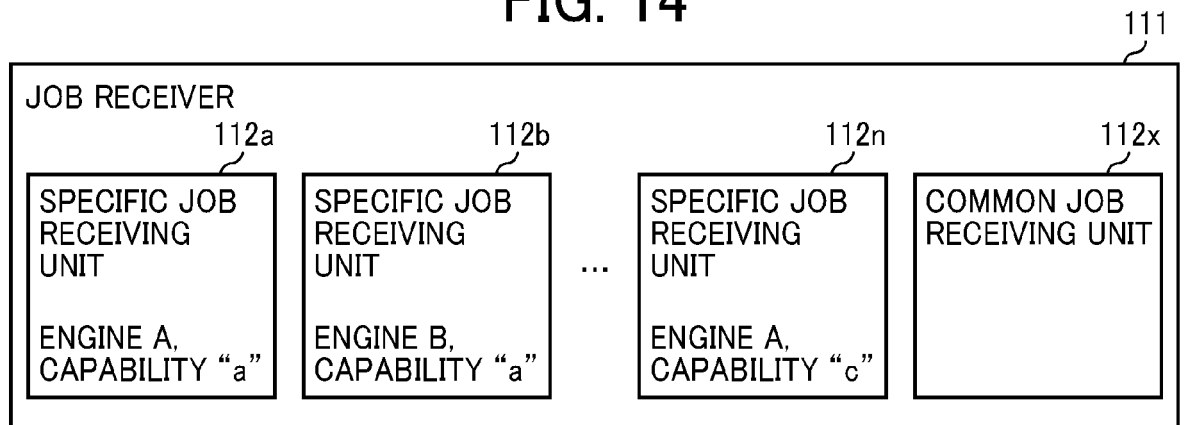


FIG. 15

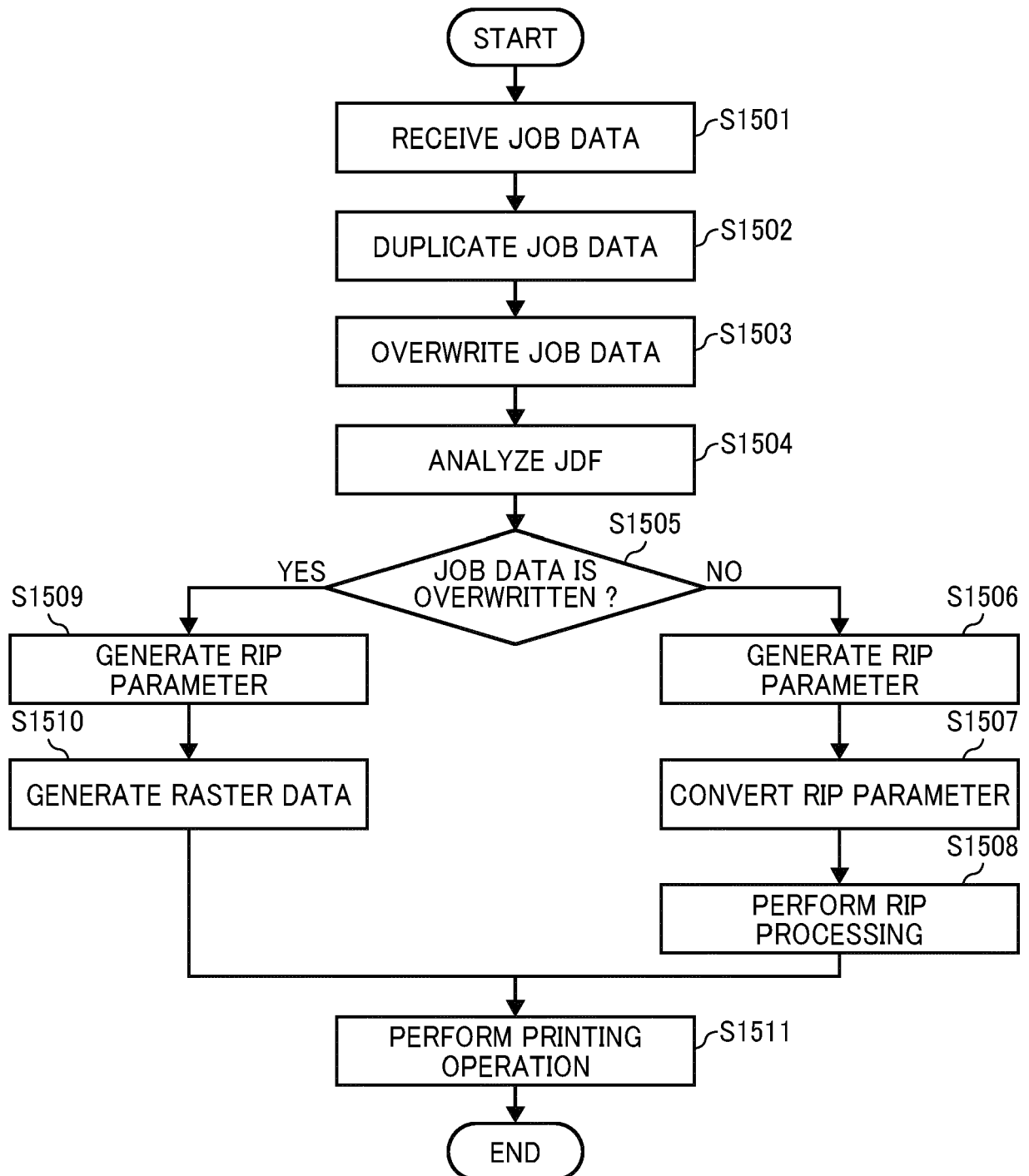
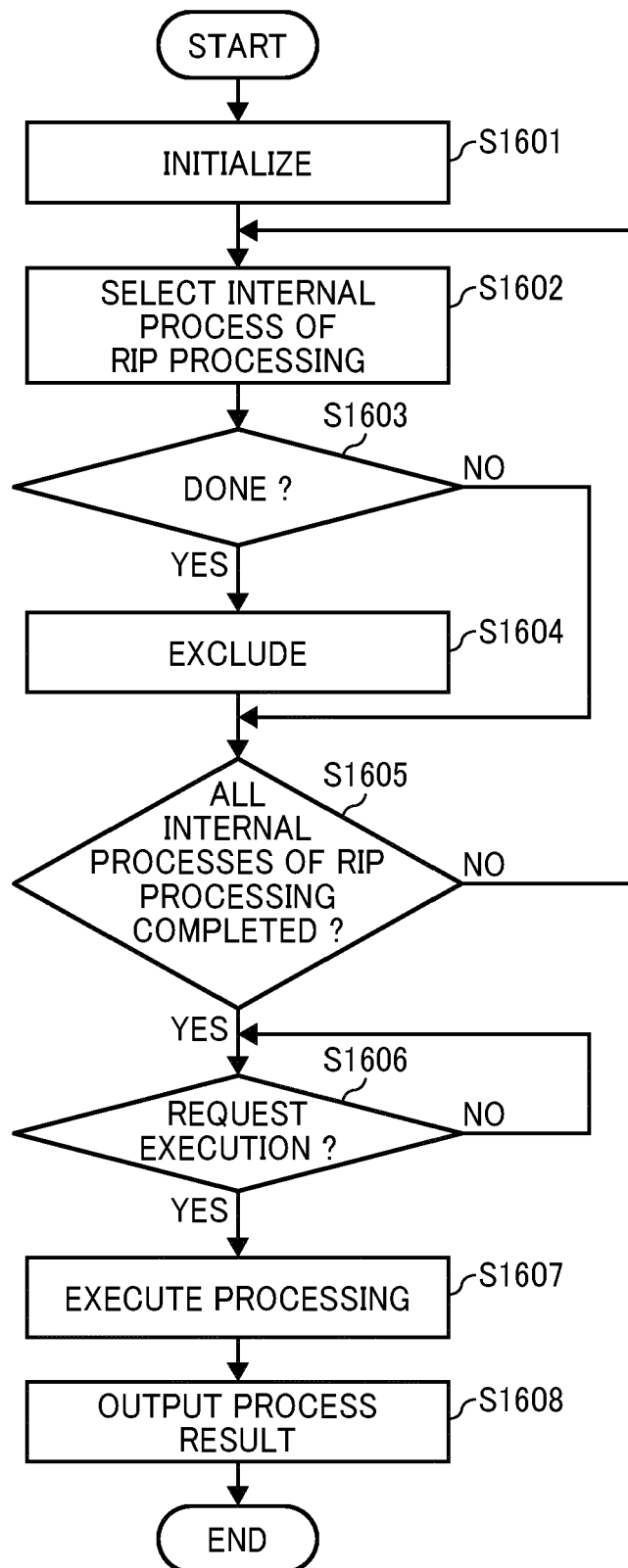


FIG. 16





EUROPEAN SEARCH REPORT

Application Number
EP 16 19 7209

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2015/235112 A1 (HABU YUICHI [JP] ET AL) 20 August 2015 (2015-08-20) * paragraphs [0031] - [0045] * * paragraphs [0053] - [0082] * * paragraphs [0116] - [0125] * * figures 2-3, 13-15 *	1-6	INV. G06F3/12 G06K15/02
X	US 2015/262044 A1 (SOCHI YOSHINORI [JP] ET AL) 17 September 2015 (2015-09-17) * paragraphs [0068] - [0071] * * paragraphs [0086] - [0112] * * paragraphs [0220] - [0297] * * figures 4,6,19-24 *	1-6	
			TECHNICAL FIELDS SEARCHED (IPC)
			G06F G06K
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 15 March 2017	Examiner Vilella, Josep
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 16 19 7209

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

15-03-2017

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2015235112 A1	20-08-2015	JP 2015172931 A	01-10-2015
		US 2015235112 A1	20-08-2015

US 2015262044 A1	17-09-2015	JP 2015187843 A	29-10-2015
		US 2015262044 A1	17-09-2015

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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2013088992 A [0005] [0007]